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CONTENTS

For complete table of contents see advertising page V

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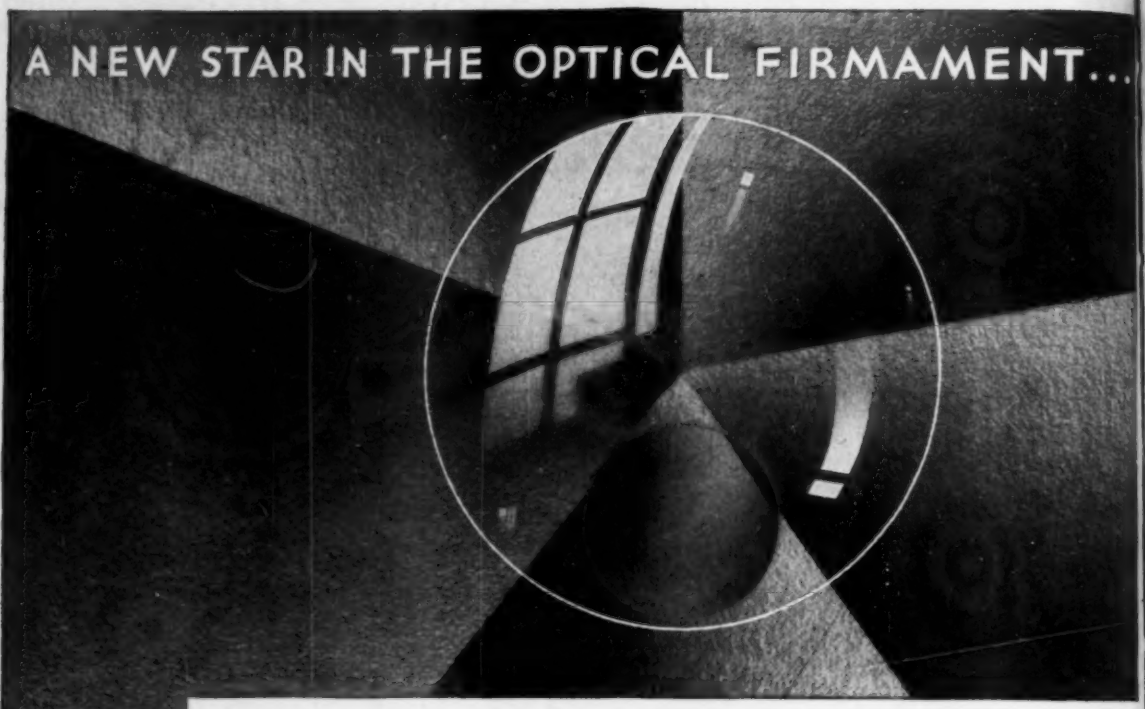

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AMERICAN JOURNAL OF OPHTHALMOLOGY

Volume 14 August, 1931 Number 8

THE CONTROL OF MYOPIA

EDWARD JACKSON, M.D., D.Sc., F.A.C.S.
DENVER, COLORADO

In 1885 Foerster pointed out the control of myopia, by wearing of full correcting lenses. The literature and the history of ophthalmology since that time, show neglect of the established facts and persistent adherence to pessimistic traditions. This paper reviews the literature and gives, in outline, nine of the most serious cases encountered, in 38 years of the practice of full corrections. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology for 1930.

Control of myopia is practical, cure is not; and prevention is still in the future. Donders[1] wrote: "The cure of myopia belongs to the *pia vota*. The more our knowledge of the basis of this anomaly has been established; the more certainly does any expectation in that direction appear to be destroyed, even with respect to the future". Thirty years after, R. D. Batten[2] quoted the above and added; "Donders was a great man, and we have very much for which to thank him. But when he wrote this, I believe he did a great injury to ophthalmic science and imposed a severe check on its development, from which it has not yet recovered. Since then numbers of ophthalmic surgeons have written on the causation and treatment of myopia and have copied and re-copied what he taught, continuing to state that myopia is incurable and unpreventable".

Batten attempted to combat pessimism with regard to myopia by urging that it was the result of constitutional disease. But his eighteen cases in which myopia was associated with about ten different diseases and constitutional conditions, some of them very indefinite, did not throw much light upon its origin; and none of the cases was followed long enough to get any case history, except the patient's account of it.

A large part of the literature of myopia, since Donders wrote, has been theoretic and philosophic. Good and complete records in cases of myopia are rare; but enough are now extant to justify a more hopeful outlook with regard to it; although the lines that have been opened up for the control of myopia are not yet generally and sufficiently appreciated.

In 1874 Hasket Derby[3], of Boston, reported his observations on myopia, treated by keeping the eyes under the cycloplegic influence of atropin, which had been advocated in Europe by Profs. Junge and Schiess-Gemuseus[4]. This plan at least fixed attention on ocular conditions and causes for myopia, and tended to dissipate the traditions and superstitions that had hung about the use of glasses, since the time of Roger Bacon's persecution for dealing in magic; because of the things he saw with the lenses he ground. In Philadelphia, Thomson[5], Harlan[6], Norris[7] and Risley[8] began to prescribe glasses, and to observe refraction cases with the ophthalmoscope. Norris and Risley reported series of cases of myopia which drew attention to the congestion of the optic nerve and choroid, frequently found in the early stages of myopia. Their papers emphasized the local conditions that produce myopia, and inaugurated a departure from the emphasis on hypothetical general conditions, like hereditary and congenital

tendencies, that could be argued about, but did not lead to practical results.

The hundreds of thousands of examinations of eyes of school children, made between 1850 and 1900, showed that myopia, in the great majority of cases, begins in school life. In Germany where these examinations were first made in large numbers, they proved that the number of cases and the amount of myopia increase yearly from the first grade to the professional schools of the universities. If anything is established about myopia it is; that, for most patients myopia starts and increases in connection with use of the eyes for near seeing, particularly reading. The idea that myopia was connected with education and intellectual development, a step in the evolution of a race of supermen, had more reasonable basis than most of the ideas that clustered about the belief in supermen, prominent in Germany before the World War.

The natural history of myopia has been best told, not by an ophthalmologist, but by a close scientific observer who lived over one hundred years ago, in an account of his own case. Sir Charles Blagden lived in the latter part of the 18th and early years of the 19th centuries. His account was first published in the Philosophical Transactions, vol. 103, and is thus quoted by Mackenzie[9] in 1833:

"When I first learned to read at the usual age of four or five years, I could see most distinctly across a wide church, the contents of a table on which the Lord's Prayer and the Belief were painted in suitably large letters. In a few years, that is about the ninth or tenth of my age, being much addicted to books, I could not read what was painted on this table; but the degree of near-sightedness was then so small, that I found a watch glass, though as a meniscus it made the rays diverge very little, sufficient to enable me to read the table as before. In a year or two more the watch glass would no longer serve my purpose; but being dissuaded from use of a common concave glass, as likely to injure my sight, I suffered the inconvenience of a small degree of myopy till I was more than thirty years of age. That inconvenience, however, gradually though slowly increasing all the time, at length became so grievous, that at two or three and thirty, I determined to try a concave glass; and then found, that the numbers two (1.25D) and three (1.75D) were to me in the relation so well described by Mr. Ware: that is I could see distant objects tolerably well with the former number, but still more accurately with the latter. After contenting myself a little time with No. 2, I laid it wholly aside for No. 3, and in the course of a few more years came to No. 5 (2.75D) at which point my eye has now been stationary between fifteen and twenty years. An earlier use of concave glasses would probably have made me more near-sighted, or would have brought on my present degree of myopy at an earlier period of life. If my friends had persuaded me to read and write with the book or paper always as far from my eyes as I could see; or if I had occasionally intermitted study, and taken to field sports, or any employment which would have obliged me to look much at distant objects, it is very probable that I might not have been near-sighted at all."

Blagden did not reject, or explain, the attitude of ophthalmic surgeons toward glasses; about which they knew very little, as compared with drugs and eye operations. That attitude continues through all the editions of Mackenzie's book. It awakened the scorn of Dr. George M. Gould; but it continues in the minds of writers of ophthalmic literature today. It is the basis of the gloomy views still held about myopia. The first Professor of Ophthalmic Medicine in Vienna, Dr. George Joseph Beer[10] strongly taught the avoidance of spectacles; and this teaching still influences an ignorant and unprogressive part of the community, and supports the dislike for glasses that we still have to overcome.

Donders[11] showed in many passages of his book on "Accommodation and Refraction of the Eye" the value of lenses, and the folly of trying to do

without them. He showed much of what the correction of refractive errors would do. But he also manifests the influence of the old teaching, in his account of the treatment of myopia. Landolt[12], in his clear and elegant work on Refraction and Accommodation perpetuates the old distrust of glasses. Helmholtz, approaching the subject from the standpoint of a physiologist and a physicist, more familiar with lenses, had a better appreciation of their value and importance. In his first edition of Physiological Optics, 1856, he wrote: "Near-sightedness is usually the result of occupation or habits requiring the close and minute examination of small objects." He also expressed his views thus: "It is particularly important to prevent myopes from holding the head down to look at near objects and from converging their eyes too much; because the stretching, pulling and distension of the membranes at the back of the eye, which thus result from the increased blood-pressure and muscular strain, soon get worse, and the increased myopia may seriously impair the vision and be dangerous. In the milder degrees of near-sightedness, for which the distance of the far point exceeds five inches, it is generally permissible to use concave lenses, and wear them constantly, that have the effect of removing the far point to infinity. This virtually transforms the myopic eye into an emmetropic one. The patient must, however, never hold books, writing, sewing, etc., nearer than twelve inches from the eye."

In 1885 Prof. Richard Foerster[14], of Breslau, whose name is connected with the invention of a photometer and the perimeter, published a paper on the "Influence of Concave Lenses on the Progress of Myopia" which was translated into English by J. A. Spaulding. Foerster's attention was directed to this subject by observing that many persons who had persistently worn over-correcting glasses from youth, did not find themselves compelled gradually to use still stronger and stronger glasses, after a period of ten, twenty, or even thirty years their glasses still corrected, or even over-corrected, the myopia.

Foerster published notes of 51 cases, in which correcting, or over-correcting concave lenses had been worn, for periods from 3 to 44 years, and he states: "I could enlarge this table still further, but it hardly seems worth the labor. If any one were not convinced by these 51 cases, that the dogma of the injury of the eye by concave glasses is false, or at least doubtful, fifty more cases would be of no avail."

Foerster traced the causation of myopia and its tendency to increase, to convergence of the visual axes, excessive in degree, or in the time it was maintained. He taught that the vicious circle can be broken by preventing excessive convergence, use of concave glasses and abducting prisms. His view of its causation opened the way to the control of myopia; and wholly changed the prognosis of it. But this has not always been understood. In a book published this year, Ritchie[15] states "Myopia is on the increase, and no doctor has yet discovered either cause or cure." The real situation was stated ten years ago by MacGillivray[16] who said: "We aim at making the child optically emmetropic and so functionally normal, the existing discord between convergence and accommodation being thus removed. With correcting glasses the myopic child need no longer be the recluse, blear-eyed, with round shoulders and flattened chest, for he can now see the world around beckoning him to come away and read from the open and varied book of Nature, rather than from the printed page in his ill-ventilated room at home".

More than thirty-five years ago it was argued before the American Ophthalmological Society[17], that myopia should be fully corrected and the correcting lens constantly worn, except at such time and to such extent as the emmetropic eye should require the aid of the convex lenses for presbyopia, and this was supported by details of 27 cases of myopia reexamined after three years. At the same time George C. Harlan[18], then President of the So-

ciety, reported thirteen cases of high myopia seen for over five years of such management, and reached this conclusion: "For myself a rather careful experience of a good many years has convinced me that excessive convergence without accommodation is the most important factor in progressive myopia, and that our most valuable therapeutic measure is the restoration, as early as possible, of the normal relation of these two functions." Among the ten members who joined in the discussion there was no dissent; except that one, then 37 years old, who had 9.5 D. of myopia said, that for reading he used glasses 2.5 D. weaker than the full correction he used for distance.

In view of the fact that myopia causes four per cent of the cases of blindness of both eyes, and is liable to lead up to other causes such as choroidal atrophy, detachment of the retina and cataract and in view of the uncertainty, confusion, ignorance and error that have come down to us from the highest authorities on ophthalmology of one hundred years ago, it seems well to devote time to studies of actual experience as to the effects of constant wearing of the full corrections for myopia and myopic astigmatism. For this purpose the case records of all myopes in my private practice in the last thirty years have been examined. Among patients under twenty-five years of age when first seen, the time of life when myopia is most likely to develop and be progressive, were found 77 cases, 154 eyes, which were examined after at least three years of wearing constantly their full correcting glasses.

These patients were under observation from 3 to 30 years, averaging the age of 16 when first seen, and 25 at the date of last observation. The youngest when first seen was 8 years old; although the history seemed to show that one child was probably myopic from birth; and one child had worn glasses from 5 years old and had a myopia of 8 and 9 D. when 9 years old.

Of the 154 eyes there were 27 that became less myopic. There were 44 eyes that showed no change of refraction. There were 52 eyes in which the myopia increased less than 1 D. There were 31 in which it increased 1 D. or more, the average being 2 D. That is, under the constant wearing of full correcting glasses, 45 per cent of the eyes showed no increase of myopia at any time; 34 per cent showed an increase of less than 1 D., and only 21 per cent showed an increase of 1 D. or over, an average increase of nearly 2 D.

Notes of cases

The cases briefly presented below include: The four cases that had the highest myopia and showed the greatest fundus lesions, the two cases in which there was the greatest increase of myopia; the cases that presented evidence of hereditary or congenital myopia, and the cases in which the myopia was most persistently progressive. Other proposed methods of treating myopia must be compared with the record of this method, of the constant wearing of the full correction; and no other method has yet made so good a showing.

Case 1.—The highest myopia encountered was in a boy, J. R., probably myopic from birth. His mother was myopic 2.5 D. His grandmother, at the age of 63 years did not wear glasses for reading. At five years old this boy had worn glasses, but probably not a full correction. For two years he was kept out of school. When seen at eleven years he had a large crescent of choroidal atrophy in the right eye and both discs were red and distorted. He was given his full correction: R.—13.D.sph., L.—12.D.sph., to be worn constantly. At seventeen years the right glass required no change, the left took —1. cyl. ax. 100° added, giving vision of 0.8.

Case 2.—N. A. had worn glasses since five years old, but not a full correction. At ten years old there were crescents of choroidal atrophy, and she required for full correction: R.—7.75D.sph.—2.75cyl., L.—7.50D.sph.—3.cyl. These were given for constant use. In seven

years the myopia had increased so that she required R.—10.D.sph.—1.50cyl., L.—9.D.sph.—2.50cyl. Vision 0.9 in each eye. Choroidal atrophy unchanged.

Case 3.—B. M. Eyes said to turn in when two years old. At six years took concave lenses 1.D.sph. At eight years 2.25D.sph., concave were needed. At fourteen years she was first given full correction for constant use: R.—7.D. sph.—0.50cyl., L.—6D.sph.—1.25cyl. At eighteen years she required R—7.50D. sph.—1.cyl., L.—6.50D.sph.—1.cyl. She went through school, and college, and at twenty-three years her correction was R.—7.75D.sph.—1.cyl., L.—7.75D. sph.—0.75D.cyl. Vision was 1.2 in each eye and choroids were normal.

Case 4.—E. W., had scarlet fever at eight years old, and since that time had been near-sighted. At twelve years she was given glasses. At fourteen her full correction was: R.—6.50D.sph.—0.75 cyl., L.—6.75D.sph.—0.75cyl. At twenty years she required R.—7.25D.sph.—1.25cyl., L.—7.25D.sph.—0.50cyl. At thirty-three years, with the same glasses she saw 1.2 with each eye, and choroids were normal.

Case 5.—B. K. at eleven years required R.—0.50D.sph.—0.25cyl., L.—0.37D.sph.—0.25cyl. At fifteen years she required R.—2.25D.sph.—0.75cyl., L.—3.25D.sph.—0.25cyl. At twenty-five years she required: R.—2.D.sph.—1cyl., L.—3.D.sph.—1.cyl. Vision was 1.2 in each eye.

Case 6.—J. K., at nine years old had been out of school six months because of poor sight. Her right eye "sight always bad", took—8D.sph., which gave vision of 6/40. Left required—1.D.sph. —0.25cyl. At twelve years the left eye required —4.D.sph. At nineteen years the right eye had not changed, and the left took —4.50D.sph.—0.37cyl. Vision was still 1.2.

Case 7.—M. A., at fifteen years noticed she recently could not see the blackboard. R. and L.—1.D.sph. gave her full vision. She had glasses changed by an optician, and at seventeen years required R.—3.50D.sph., L.—3.25D. sph. At nineteen years she took R. —4.D.sph.—0.25cyl., L.—3.75D.sph.—0.25cyl. She finished school and worked as a stenographer. At twenty-six years she needed R.—5.25D.sph.—0.25cyl., L. —5.D.sph.—0.37cyl. Vision was still 1.2 in each eye.

Case 8.—M. S., aged twenty-two years, whose mother has myopia and cataract, and a brother myopia and retinal detachment, came for blurred vision and headaches. He was given R. —1.D.sph.—0.50cyl., L.—1.25D.sph.—0.37cyl. At twenty-six years he required R.—2.D.sph.—0.50cyl., L.—1.75 D.sph.—0.50cyl. At thirty-five years he was given for full correction R.—3.D. sph.—0.37cyl., L.—2.37D.sph.—0.87cyl. At forty-four years he required R.—3. D.sph.—0.50cyl., L.—2.D.sph.—1.37 cyl. At forty-eight years he is wearing: R.—3D.sph.—125cyl., L.—2.50D.sph. —1.cyl., with + 1. added for reading. His vision is R. 1.2+, L. 1.2. minus.

Case 9.—M. C. H. At twenty-one years came with narrow crescents of choroidal atrophy, discs dragged and myopic astigmatism, requiring R. —5.50D.sph.—0.50cyl., L.—3.50 D.sph. —0.50cyl. At twenty-eight years she took: R.—5.25D.sph.—0.25 cyl., L.—3.D.sph.—0.50cyl. At thirty-eight years there was no change in her refraction. At forty-seven years she required R.—4.D.sph.—1.cyl., L. —2.75D.sph.—0.50cyl. There is no increase of choroidal atrophy and her vision in each eye is 1.2.

What to do for myopia

The control of myopia must be based on an understanding of its causes and manner of development. Its treatment has been largely dominated by making guesses and theorizing about them. When the distension of the sclera was found to be an outstanding result its causes were guessed at. Graefe guessed that accommodation might increase intraocular pressure and failed to see that convergence could do it. From his day to ours, his guess has tended to keep alive a fear of concave lenses, because they would increase the use of accommodation. Donders, who argued so con-

vincingly for the use of lenses in hyperopia and astigmatism, distrusted them for myopia. Landolt wrote "We generally recommend young persons and those who are but slightly myopic, to wear glasses only exceptionally. It is for this reason that we have them mounted in hand-lorgnettes, or eyeglasses", as though he were under the influence of Beer's chapter on the "Present Rage for Wearing Glasses", he printed in capitals: "A myope must be prohibited from wearing a concave glass for any distance at which he can see clearly without accommodation".

The fear of allowing a myope to use his power of accommodation still controls many in regard to the prescription of lenses; although Hess and Heine showed it did not tend to increase intraocular pressure; and Foerster had proved that concave lenses tended to arrest the progress of myopia. Then, too, all our knowledge of miotics and mydriatics indicates that accommodation does not increase intraocular pressure.

The enormous statistics showing the increase of myopia during school life, and all careful observations of its course from Sir Charles Blagden in the 18th century to the present day, indicate that the development and increase of myopia depend on convergence of the eyes for near work, and that avoidance of such convergence, by occupation and the use of concave lenses, is the foundation of its rational control. Axial myopia begins in childhood, or at birth. There is nothing to indicate that senile myopia is due to increased length of the antero-posterior axis of the eyeball; and every reason to believe that it is due to changes in the refraction of the crystalline lens. For the common, most important, form of axial myopia the program includes:

1. Avoidance of much use of the eyes for near seeing in early childhood, during the period of most rapid development and growth, up to six to ten years.

2. Testing the vision and examining the eyes of children entering school, especially for ocular defects that will lead to excessive convergence. Such testing should include accurate measurement of ametropia.

3. Watching the children in school to secure an erect posture and keeping of the book away from the eyes. Good print and good illumination both in school and in the home. Foerster showed that the home work done with the eyes was greater than the work in school.

4. Sight-saving classes for children having poor vision, or suffering from any ocular condition that would be seriously aggravated by ordinary school work. Each of these children should be placed in such a class on the advice of an oculist, who should see the child every three months, so long as the sight-saving supervison was necessary. In such a class the child should spend a part of the day in the special room for sight-saving instruction, and a part reeeiving oral instruction with seeing children of the same grade.

5. The constant wearing of accurate correcting glasses, especially of full strength concave glasses.

6. Regular daily, outdoor living and exercise; for children, youths and young adults.

7. Close attention to the child's general health and nutrition, including care as to vitamins, and endocrine secretions. As to hereditary and congenital myopia, this may need to be extended to the care of the expectant mother.

Such a program intelligently carried out would prevent most cases of myopia: would limit to low degree most of the cases that did arise: would prevent the degenerative changes that characterize the later stages of high myopia; and would prevent about four per cent of the blindness that now occurs in civilized countries.

1120 Republic building.

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SOME INTERESTING EXPERIENCES IN THE CLINICAL PHARMACOLOGY OF THE EYE

By David I. Macht, M.D., Phar.D., Litt.D., F.A.C.P.
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Four interesting experiences are recounted in each of which a prescription properly prepared from chemicals conforming to required standards as proven by subsequent tests produced unexpected results in the eyes of the patient. A solution of pilocarpine 2% with eserine ½% produced mydriasis. A solution of homatropine hydrobromide producing extreme and prolonged mydriasis was found to be contaminated with atropine. Pharmacologic tests were necessary in this connection, being much more delicate than any chemical test. A pilocarpine solution of high purity was found irritating to the eyes of a patient because of unusual sensitization to small differences in hydrogen ion concentration. Read before the Ophthalmological Section of the Baltimore City Medical Society Feb. 26, 1931.

Introduction

The present communication is a direct result of a happy concatenation of circumstances which it may be well to enumerate by way of introduction. In the first place, the writer is a specialist in pharmacology but not exclusively of the theoretic type. While he has been extensively engaged in the study of abstract and fundamental problems pertaining to pharmacology and toxicology, he has always been particularly interested in the clinical applications of the subject, in other words, in practical pharmacotherapeutics and toxicology. In the second place, the author happens to occupy a unique position in pharmacology because, on the one hand, he is a lecturer in pharmacology at the Johns Hopkins University and, on the other hand, he is at the same time the director of a pharmacological research laboratory maintained by a well-known pharmaceutical concern. In this way he has exceptional opportunity of coming in contact with the two professions which are most intimately interested in pharmacology, namely, medicine and pharmacy. In the third place, it happens that the pharmaceutical firm, of which he is pharmacological director, maintains a high-grade retail prescription department and when difficulties of a pharmacological or toxicological nature happen to crop up, such problems are frequently referred to him for his opinion and advice. It is in connection with the prescription department that the present experiences have been encountered. Curiously enough, in the last four years, during which time thousands upon thousands of prescriptions have been filled by this pharmacy, there have been more questions raised in connection with medicaments compounded for the treatment of eyes than with those pertaining to any other branch of medicine.

Experience 1

A prescription by Dr. C. A. C., for Mrs. J. C. H., calling for eye drops containing eserine, one-half of a grain, and pilocarpine, four grains to the half ounce, was presented at the pharmacy and duly compounded. Soon after the medicine was employed by the patient, she complained that it did not act properly; and the physician confirmed her findings. Instead of effecting miosis or constriction of the pupil, the drops produced a dilatation of the patient's eye; and Dr. C., who tried the same medicine on himself, obtained the same result. On reporting this peculiar action of the drops to the prescription department, another bottle of the same medicine was immediately prepared according to the directions on the prescription; and these drops also produced dilatation of the pupil. The crystalline ingredients employed in compounding the prescription were then submitted to a chemist for identification. The chemist reported that, as far as he was able to determine by ordinary chemical tests, the eserine salicylate gave the chemical reactions of eserine salicylate and the pilocarpine hydrochloride gave the chemical reactions of pilocarpine hydrochloride. He could not say defi-

nitely whether impurities of a mydriatic nature were present either in the solutions or in the original crystalline salts of the alkaloids. The whole matter was then referred to the pharmacologist for his opinion.

The first step in the pharmacological investigation was to test the original drops in regard to their effect on the pupil of the cat's eye. Two drops of the solution, instilled into the conjunctival sac of a cat, produced mydriasis. When the solution was tested on the rabbit's eye, the same result was obtained. A fresh prescription compounded from the same ingredients again caused a similar reaction. It was then decided to investigate separately all the samples of eserine and pilocarpine in stock.

Three specimens of eserine salicylate were found on hand, and a one per cent solution of each was prepared and examined in respect to its miotic properties. It was found that the three specimens of eserine all differed in their miotic potency when two drops of a one per cent solution of each were tested on the cat's or the rabbit's eye. One specimen, which was old, produced very little constriction of the pupil: the other two were both miotic in their action, but one of the solutions, which had been prepared from a tablet triturate of eserine salicylate, was not quite as effective as the other, prepared from crystalline eserine salicylate.

An examination of the pilocarpine hydrochloride found in stock was very much more interesting and important. Two specimens of pilocarpine hydrochloride were studied, one of which had been used for preparing the "unsatisfactory" eye drops in question and the other, which had been taken from a new bottle that had not been used before and was opened for the first time for the purposes of the present investigation. A one per cent solution of each of the specimens of pilocarpine hydrochloride was prepared and studied on the eyes of cats and rabbits in two series of experiments, and in each case the results obtained were quite decisive. When two drops of the unsatisfactory pilocarpine hydrochloride were instilled into the conjunctival sacs, no constriction of the pupil was produced and, in fact, some of the animals exhibited a definite mydriasis. Instillation of the solution made from the new bottle of pilocarpine hydrochloride, however, produced a very marked miotic or constricting effect in both cats and rabbits. It may be stated, however, that when large doses of the unsatisfactory pilocarpine solution were repeatedly instilled into the eyes of the cats, a very slight constriction was finally produced in some of the animals. This, however, could not be obtained with small doses of that solution.

A further comparison of the two specimens of pilocarpine hydrochloride was then made by means of other pharmacological tests. It is well known that pilocarpine is a powerful stimulant of intestinal contractions, an effect produced through its pressor or stimulating effect on the myoneural junctions of the parasympathetics. Again, pilocarpine hydrochloride, through its stimulating effect on the vagus nerve endings, is known to produce an inhibition or slowing of the heart beat. Moreover, pilocarpine exhibits a very characteristic sialogogic effect. Experiments were performed by the writer on rabbits with injections of five milligrams of the old and new pilocarpine hydrochloride solutions, respectively, and the effects upon the salivary secretion, the heart rate, and intestinal movements were observed. Thus it was found that there was a definite and marked difference between the two specimens of pilocarpine hydrochloride. The fresh, miotic-producing pilocarpine engendered a powerful stimulation of intestinal movements, a marked slowing of the heart beat, and a profuse salivary flow. The pilocarpine hydrochloride from which the unsatisfactory eye drops were made, on the other hand, was much weaker than the other specimen in all these respects.

Having definitely established that the ingredients of the unsatisfactory eye drops were not of the required pharmacological potency and, more particularly, that the pilocarpine hydrochloride exhibited anomalous phar-

macodynamic effects, the author wrote a polite letter to the well-known chemical firm manufacturing these alkaloids and called their attention to the matter. The reply received was of an extremely interesting nature. The manufacturers thanked the writer for calling their attention to the unsatisfactory pilocarpine specimen and stated that they had received a similar complaint concerning an ounce bottle of pilocarpine hydrochloride from a Washington physician, who wrote that the alkaloid behaved abnormally in a patient's eyes. They immediately took steps to investigate the material from Washington and found that all the physical and chemical properties agreed with the latest published figures, namely: the melting point was 204-5° C.; the specific rotatory power was found to be +91°; and all the other chemical tests made with the alkaloid complied with the requirements of the United States Pharmacopoeia. In addition to the foregoing tests, they examined the material for the presence of foreign mydriatics such as atropine, homatropine, scopolamine, cocaine, etc., as well as for other salts of the alkaloids, all with negative results. They then turned to the biological behavior of the compound and found, just as the present writer has discovered, that when two drops of a one per cent solution were instilled into the conjunctival sac of a cat's eye, a marked mydriasis was produced. The conclusions which we may therefore draw from this experience are that there must be some modification in the internal structure of this particular sample of pilocarpine hydrochloride, which is responsible for its abnormal pharmacological behavior. Furthermore, it may be inferred that it is well to include a regular routine assay of pilocarpine before putting it on the market.

The present writer has been especially interested in this case because it emphasizes a scientific truth not sufficiently known to the majority of physicians and even laboratory investigators. Physiological and pharmacological tests are often very much more sensitive and delicate than chemical or physical tests for certain powerful drugs. Professor Reid Hunt recently gave a remarkable illustration of this fact in a brief article published in Science[1], in which he states that one milligram of acetylcholine dissolved in five hundred thousand gallons of blood could easily cause a distinct fall of blood pressure in a cat and that even smaller concentrations of acetylcholine could affect the beating of a frog's heart. Again, the uterus of a virgin guinea pig will respond to such dilute concentrations of histamine as could not be estimated quantitatively by even the most refined microchemical methods; and the very highly potent compound "A" obtained by Professor Abel from the posterior lobe of the pituitary gland is forty or more times more powerful in this respect, as shown by tests on the isolated uterus and on certain preparations of the urinary bladder[2]. Hatcher is able by biological means to determine minute quantities of strychnine much more readily than by chemical methods[3]; and Macht and Anderson have found delicate pharmacological methods extremely useful in detecting differences in activity of drugs produced by polarized light[4].

Experience 2

In this case the advice of the present writer was sought by a druggist who filled a prescription which did not act satisfactorily. The prescription called for a solution of homatropine hydrobromide for mydriatic purposes and was filled in a routine way. When the eye drops were used by the patient however, the result was an extreme mydriasis or dilatation of the pupil which lasted for nearly a week. The ophthalmologist suspected the presence of another mydriatic. An examination of the eye drops by a chemist was unsatisfactory and could not establish with certainty the presence of atropine in the solution. When it was submitted to the present writer, however, the problem was very easily solved. A standard solution of homatropine hydrobromide was prepared and another standard solution of

atropine hydrobromide was prepared. These were tested pharmacologically on the eyes of various animals and compared with the action of the suspected solution. It was noted very quickly that the homatropine mydriasis was of much shorter duration than that produced by the solution of atropine. The extreme dilatation produced by homatropine in cats has worn off, for the most part, at the end of twenty-four hours and disappears completely in forty-eight hours. The mydriasis produced by atropine, however, lasts for several days and sometimes a week or longer. The suspected eye drops were found to produce a long-lasting mydriasis very much like that of atropine, and the conclusion was inevitable that the homatropine had been contaminated largely by atropine.

The pharmacological tests described above are useful in differentiating between the action of atropine and homatropine. Macht has investigated the comparative pharmacology of these two alkaloids several years ago and shown that the mechanism of action of the two is not the same[5]. The mydriasis produced by atropine, which is chemically tropine tropate, is due exclusively to the paralytic effects of the drug on the parasympathetic nerve endings of the oculomotor nerve supplying the pupil of the eye. Again, comparative tests with atropine and homatropine on the parasympathetic paralysis produced on the vagus nerve of the heart revealed that homatropine is very much weaker than atropine in this respect. Further experiments on the effects of the two alkaloids on smooth muscle revealed that homatropine, at least to some extent, has a direct action on the muscle substance, this being due to its peculiar chemical structure. Homatropine is chemically the tropine salt or ester of mandelic acid. Mandelic acid, being closely related to benzaldehyde and various benzyl compounds, exerts in common with those compounds, an antispasmodic effect on smooth muscle fibers. A comparison of atropine and homatropine solutions on smooth muscle will therefore reveal a quantitative difference in their action, which may be useful in differentiating them.

Experience 3

The potency of homatropine preparations in the writer's experience is a variable one. In this connection, the present instance is a good illustration. The chief pharmacist of a government hospital consulted the writer in regard to difficulties he had incurred through the filling of an ophthalmological prescription. The order called for a solution of homatropine and, having several samples of homatropine in stock, he selected one of these at random for filling the prescription. Soon after the pharmacist was censured for making an error in compounding the prescription because the dilatation of the pupils produced by his eye drops lasted several days. Here again, the question arose in regard to the confusion of atropine with homatropine, and the present writer was asked to throw some light on the subject. Four different samples or vials of homatropine were in stock of the pharmacy in question. One of these was a German homatropine; the other three samples were different specimens of English homatropine. These four different specimens were compared with the chemically pure homatropine in the writer's laboratory and with a chemically pure atropine hydrobromide solution. It was found that each of the homatropines was different in regard to its mydriatic activity. The three English homatropines differed from each other and the German one was different from the English samples. Some of these homatropine specimens were very powerful mydriatics and were evidently contaminated with more or less atropine. An examination of the melting points of the various specimens and some of the other simple chemical properties was of very little help in distinguishing one from the other. The differences, however, were quite marked and easily detectable when a pharmacological examination was undertaken. This was made in two ways: on the one hand, by tests on eyes of various animals and, on the

other hand, by a special method devised by the author in which he compared the relative toxicity of the various specimens for the growth of living seedlings of *Lupinus albus*, in other words, by the phytopharmacological methods he has developed in recent years[6].

Experience 4

This is a very remarkable case which strikingly illustrates the delicacy of certain biological reactions. Dr. H. B. J., a well-known physician of this city, having a tendency to glaucoma, has been in the habit of instilling into his eye sacs a solution of pilocarpine. One day, on having his prescription renewed at the pharmacy of Hynson, Westcott and Dunning, Inc., the patient experienced a novel effect, which he promptly brought to the attention of the druggists. He returned the drops with the statement that they were "liquid fire" when applied to his eyes. A fresh solution of eye drops was compounded according to specifications but with the same results; and the patient, becoming vexed, had a third quantity of the same prescription prepared in a small drug store, not far from his residence. These last drops, he claimed, were perfectly bland and satisfactory. What was the solution of the riddle?

Chemical examination of the ingredients revealed that they were of the highest chemical purity obtainable; the care in compounding the prescription had been most meticulous; and no explanation was apparently available on either chemical or pharmaceutical grounds. The matter was referred to the present writer for investigation. Solutions from the various specimens in stock were prepared and tested on animals. All of these pilocarpine samples were found to be very efficient in regard to their miotic properties and, as far as could be determined from animal experiments, none of them produced any irritation of the conjunctiva. These specimens were also tested on several healthy patients and were found to produce miosis or constriction and no particular irritation of the eye. On pondering over the case, the author conceived the idea that possibly through very prolonged use of the eye drops, the patient might have become sensitive to very slight differences in the physicochemical properties of the solution, more particularly in regard to their hydrogen ion concentration. Accordingly, the hydrogen ion concentration of various solutions of pilocarpine was determined and it was found that when the best and most efficient pilocarpine specimen was dissolved in *distilled* water, the pH was 5.10. When, however, the same pilocarpine was dissolved in *tap water*, which is distinctly alkaline in Baltimore, the pH was 5.35. It was then suggested that the eye drops in this particular prescription be buffered so as to make their hydrogen ion concentration a little more alkaline. As soon as this was done and the eye drops were sent to Dr. J., he reported as follows: "I want to tell you that the drops which Dr. Macht has prepared for me are perfectly bland and satisfactory, and I have used them entirely without irritation in my eyes." It was obvious that the patient's conjunctival mucous membranes had become so sensitive that they could detect comparatively small differences in the hydrogen ion concentration of collyria. The lesson taught by this case is that extreme accuracy in compounding of prescriptions, instead of being a virtue, may sometimes be a real source of irritation. The druggist "around the corner," who dissolved his non-too-pure pilocarpine in ordinary tap water, prepared a solution which was not so acid and therefore not so irritating as that prepared by the very careful pharmacist who, using chemically pure pilocarpine dissolved in double distilled water, produced eye drops of a slightly more acid reaction.

Summary

The cases described above are presented because of their interest as emphasizing the following practical points:

1. The occurrence of abnormal physiological effects after the use of certain important alkaloids in ophthal-

mological practice, more particularly, of eserine and pilocarpine.

2. The great variations in potency and effectiveness of various specimens of homatropine on the market.

3. The importance of applied pharmacology in connection with ophthalmological therapeutics.

4. The extreme delicacy of certain pharmacological tests as compared with physical and chemical examination of powerful drugs, especially in regard to the detection of contaminations and variations in their therapeutic potency.

5. The importance of constantly bearing in mind the idiosyncrasies and extreme sensitiveness on the part of patients to even very small differences in the composition of prescriptions.

Pharmacological Research Laboratory,
Hynson, Westcott and Dunning.

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THE FILTRATION OPERATION OF MAUKSCH FOR CHRONIC GLAUCOMA WITH PRELIMINARY REPORT ON TWENTY-FOUR OPERATIONS

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Considerations of drainage operations in general are given and a description of the Mauksch operation. There follows an analysis of early results in twenty-four cases. Read before the Chicago Ophthalmological Society, December 15, 1930.

It is not the purpose this evening to open a discussion on filtration angle operations, but to give an idea of the worth of a certain filtration operation. The operation to be presented is named the Mauksch; it should be called either a suprachoroidal iridotasis or an intraocular iridencleisis; anatomically speaking the former is the better terminology. The various operations which give filtration fistulæ are trephining, cyclodialysis, root iridectomy, iridencleisis, and iridectomy if properly performed. No other operation is so satisfactory for acute glaucoma—not secondary, or primary glaucoma—as iridectomy. In all cases of chronic glaucoma an iridectomy pure and simple is to be deprecated. One should never attempt to do an iridectomy for simple glaucoma or when there are no inflammatory symptoms.

The etiology of glaucoma is enshrouded in mystery, so also its pathology and its remedial surgical measures. We know that glaucoma depends largely upon whether there is decreased, increased or retarded secretion; in any event a compensatory drainage must be established. The only logical anatomical drainage within the eye is suprachoroidal, not subconjunctival. Therefore any operation that leads to subconjunctival drainage is mechanically at fault. It succeeds in many instances, no doubt, because of the very fact that it produces a fistula, or an opening into the suprachoroidal space, through which drainage takes place. For that reason the classical Elliot operation answers the purpose very nicely. Any operation for chronic glaucoma that attacks the iris and leaves it exposed underneath the conjunctiva is not a rational operation, even though it may further drainage. It is dangerous, not only because of a possible secondary infection, but because of a possible iridocyclitis, with consequent descending uveitis resulting in an optic atropy with a chronic glaucoma. Therefore, any operation which will give a drainage into the suprachoroidal space, however made, will serve. For that reason cyclodialysis is a very good operation, but unfortunately it is not always successful or permanent, because there is no free pigment left in the space where the ciliary body and the root of the iris is separated. If any deposition of iris pigment is in the wound, absolute anatomic healing does not occur and a microscopic drain is established, and as long as it continues there will be an adequate reduction in tension in the majority of cases.

The results with root iridectomy are almost similar; the secret being to grasp the iris as near the root as possible and during its withdrawal, to allow it to deposit some of its pigment as it is brought over the scleral edges. This gives a very fair suprachoroidal drain; other than that there is no drainage.

In any case of glaucoma there may be a deep or a shallow anterior chamber. If deep, it is not always necessary to do an iridectomy or implant the iris, but if the anterior chamber is very shallow or the iris comes in contact with the posterior surface of the cornea, an iridectomy should be made. Clinical experience has proven these suggestions satisfactory. It is not because of insufficient drainage in a glaucomatous eye that it comes to wrack and ruin, but because of the pathologic processes which eventuate into a secondary optic atrophy. By and large, eventually all chronic glaucoma patients, if they live long enough, will be essentially blind—that is, they will have less than economic vision. There is no such thing as chronic glaucoma existing for years and years,

with retention of the same visual acuity and fields as on the first day it was detected.

The majority of filtration operations have the drawback that the capsule or zonule of the lens is often injured, thereby causing a complete or partial secondary cataract, particularly if the anterior chamber is shallow. Should a cataract develop, a proper corneal section can be made with or without a small conjunctival flap, and the lens safely extracted. The majority of operations, however, with the exception of the deep root iridectomy (Suker and Cushman in The Amer. Jour. of Ophth., Apr., 1926) and the operation about to be described, will not permit an easy corneal section or a conjunctival flap to be nicely made. It is not so difficult in cyclodialysis, but the flap is frequently brought too close to the limbus, so that it is impossible easily to get any conjunctiva for a satisfactory flap.

This suprachoroidal iridotasis or intraocular iridencleisis (Mauksch's Operation) from a mechanical standpoint, is a combination of nearly all the filtration operations. It includes sclerotomy, cyclodialysis, iridectomy if you wish—because the iris is practically separated at its periphery—and iridotasis—as the iris is left intact in this supra-choroidal channel.

The Mauksch operation is quite simple to perform; anyone familiar with any of the other filtration operations can execute it with ease and safety. The technique is about as follows:

The conjunctiva is dissected as for cyclodialysis or trephine, to within 2½ to 3 mm. of the limbus. Then a scleral section of 4-5 mm. long is made at about 6-7 mm. from the limbus, parallel with the cornea, through the sclera down to the choroid. With a cyclodialysis spatula, its 1 cm. end bent at an angle of 45 degrees, a liberal cyclodialysis is made, and with very fine narrow iris forceps, also having a 45 degree curve, passed through this channel, the pupillary edge of the iris is grasped and gently drawn into this channel, almost to the scleral section, so that when the iris is pulled up, just the very tip of the forceps is seen. The iris rests there and the edge of the wound is massaged with the spatula to lessen the thickness of the iris and allow some of the iris pigment to adhere at the inner edge of the scleral wound. In withdrawing the iris, almost a complete turn is made with forceps, giving the iris a spiral curve or turn, allowing the pigment surfaces to face each other, thus ensuring a drain. The section in the sclera should not be much more than the width of the cyclodialysis blade, which ordinarily is about 3 or 4 mm. wide. The conjunctiva is replaced with two or three sutures and atropin is instilled. In all filtration operations which attack the iris, atropine should be instilled immediately. Have no fear of increasing the tension. Atropine aids the iris to remain in place by keeping it fully dilated. When the operation is finished there is no bleb, but there is only a moderately bruised iris in this channel. The preparation of patient and field should be the same as for any filtration operation; deep intraorbital anesthesia is preferable.

Precaution should be used not to have too large a scleral section. The knife to use is bellied. (See cut) It allows a cutting of only 4 or 5 mm. on the curve of the sclera. The next point is not to withdraw the iris beyond the scleral section, thus avoid leaving the iris subconjunctival. In entering with the spatula (see cut) the point is directed

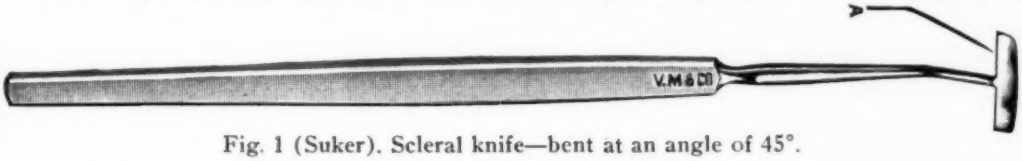

Fig. 1 (Suker). Scleral knife—bent at an angle of 45°.

Fig. 2 (Suker). Cyclodialysis spatula—tip bent at an angle of 45°.

slightly upward and gently pushed forward into the anterior chamber, then there is no danger of perforating the choroid. When entering the anterior chamber, care should be taken not to scrape the posterior surface of the cornea. Another point is not to use any downward pressure, thus avoiding any interference with the zonule of Zinn or lens capsule. The scleral wound should be about 4-5 mm. in length. The forceps need be opened only 1 mm., and therefore are made very narrow and delicate.

Fig. 3 (Suker). Iris forceps—very narrow blades, curved at an angle of 45°.

The advantage of this operation is that it is a combination of all the filtration operations, and so far in the twenty-four cases operated on since the first of the year (1930), the majority of which were of the chronic type, the results have been very satisfactory indeed. It was tried on one case of acute secondary glaucoma with a good result. The majority of the patients had vision of less than 20/200, which of course was not the most favorable class of cases.

The reaction to the operation is very slight, at least not more than following an iridectomy or cyclodialysis. A reduction in the tension in all the subacute or chronic types was obtained. There was no difficulty in grasping the iris or drawing it into the channel. In no case was the lens, zonule or capsule injured nor was there in any case a subsequent secondary cataract or cyclitis. In this series the highest tension was 92, (Gradle-Schiøtz), which was brought down to 42. The average reduction in tension was from 25 to 30 points, and in the majority of cases it has remained within

Table (Suker.) Results of Mauksch operation for glaucoma.

Case	Age	Type	Vision				Tension				Period	Reaction	Result
			Before		After		Before		After				
			R	L	R	L	R	L	R	L			
1	25	Bi. Ch.	4/200	6/200	15/200	10/200	36.5	36.5	24	24	10 mo.	0	G
2	63	U. Ch.	5/200	20/100	20/100	20/100	55	19.5	29.5	21.5	2½ mo.	0	G
3	35	Bi. Ch.	L.P.	L.P.	L.P.	F. 6″	60	60	60	20	7 mo.	0	G
4	59	U. A.	En.	F. 6″	En.	20/100	En.	65	En.	36	5 mo.	Sl.	G
5	50	Bi. Ch.	Sh.	0	Sh.	0	70	70	58	40	1 mo.	Sl.	F+
6	55	Bi. Ch.	3/200	8/200	15/200	20/200	51.5	59.5	37	28	1 mo.	Sl.	G
7	61	Bi. Ch.	0.2	L.P.	0.1	F 5/200	42	42	22	20	4 mo.	0	G
8	50	Bi. Ch.	0	0	0	0	37	37	26	24	5½ mo.	0	G
9	50	U. S.	0	L.P.+P	0	0.3	18	74	18	22	3 mo.	0	G
10	56	Bi. Ch.	0.3	0.1	0.2+	0.1+	37	47	20	22	1½ mo.	0	G
11	52	R.A. L. Ch.	5/200	0.5	0.3	0.3	75	60	17	22	1 mo.	Sl.	G
12	52	U. Ch.	0	0	0	0	92	28	42	28	1 wk.	0	?
13	35	U. A.	1.5	H.M. 6′	1.5	0.1+	20	81	24	72	2 mo.	0	?
14	55	U. S.	0	L.P.	0	0	46	57	42	72	5 wk.	0	?
15	68	Bi. Ch.	F. 2″	F. 1′	H.M.	F. 1′	46	58	33	33	2 mo.	v.s.	?

Key: R—right
L—left
U—unilateral
Bi.—bilateral
A—acute
Ch—chronic
S—secondary
F—fingers
H.M.—hand movements
L.P+P—light
G—goodperception and projection
F—fair
En—enucleated
V.s.—Very Severe
Sh.—Shadows
O—Nil
Sl—Slight

normal limits. In several cases the vision was markedly improved. The field of vision was not materially changed in any case, as all had fields within the 20-25 degree circles. In several no fields could be taken, but in none was the field decreased or obliterated. The longest period of observation was ten months, the shortest ten days after operation (this patient failed to return as requested, though at time of discharge the operation was considered successful.)

The number of patients operated on was 15 (Service Cook Co. Hospital, Chicago)—six had unilateral glaucoma and nine had bilateral glaucoma, making in all 24 operations. Of these, twenty were considered successful. The four so-called failures are: the first (case 13) had to have a cyclodialysis performed to control tension; the second (case 14) had a prolapse of the choroid because the scleral section was altogether too large (a subsequent scleral suture saved the case); and the third (case 12) was followed for only about a week after operation. A possible fourth case (15) may be looked upon as more or less a failure because though the tension was materially reduced, there followed a violent reaction, which subsequently subsided. However the eyes have remained quiet, and tension now is always around 30.

The tonometer used throughout was the Gradle-Schiøtz.

The series of cases is rather small and the period of post operative observation not overly long. Still the results achieved do point to a permanency. Since this paper was read an additional 15 cases have been operated on with correspondingly good results and will be reported later.

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DIVERGENCE PARALYSIS

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SAINT LOUIS

A case of this rare condition is described. Presented before the Saint Louis Ophthalmic Society, February 27, 1931.

Divergence anomalies are frequently encountered when systematic tests of the ocular muscles are made as a routine procedure in the examination of the eye. Paralysis of divergence, however, is a rare condition, not usually encountered more than two or three times during the average lifetime of practice. I report this case because of its rarity and in order to point out the characteristic features of this condition.

Case Report. Mrs. C. M., a white grandmother, 71 years old, entered Barnes Hospital on the general surgical service, December 11, 1928. She was hospitalized because of a carcinoma of the right breast which had been observed five years previously but had not been treated.

Mrs. M. had always been an unusually healthy woman and had reared six children. One child had "crossed eyes" and another had required a thyroidectomy. She herself had worn glasses since the age of puberty. Other medical history was negative.

In October, 1928, that is, about two months prior to admission, she had a severe pain in the left side of the neck and occipital region. Shortly after, she developed a diplopia which has persisted ever since.

The general physical examination revealed the following positive findings: There was a hard mass, 3 cm. in diameter, fixed to the skull over the right temporo-parietal junction. In the right breast there was a bluish raised mass 2 cm. in diameter, which was hard and connected with a hard mass four times this size embedded in the deeper tissue. The whole mass was freely movable, not connected with the deep fascia, but connected with the skin, producing a "pig skin" appearance. There was also a hard mass in the right axilla.

An examination made by a neurologist was reported as negative.

The laboratory findings were also negative.

The x-ray report read as follows:

"December 12, 1928. Barnes Hospital No. SPP 2111. Lateral stereoscopic films of skull; left side to film. Lying in the right frontal region apparently in the soft tissues well without the external table of the skull is a large ovoid area of complete opacity, apparently a calcified plaque within the soft tissues of the scalp. About 3 cm. in advance of the line of the lambdoid suture and also on the right side is a circular area, punched-out in appearance, showing complete absence of bone structure, indicative of destructive process at this point.

"Throughout the entire squamous portion of the frontal bone on the left are visualized indistinctly numerous small irregular areas of questionable loss of substance. There is complete disorganization of the sella and dorsum with marked depression of the bone and loss of all normal outline.

"**X-ray Diagnosis:** Metastatic tumor of cranium, carcinoma. Destructive lesion of sella turcica. Soft tissue calcification."

Because of the diplopia and absence of demonstrable paralysis of the external ocular muscles, I was asked to see the patient shortly before she left the hospital surgical procedures not being attempted.

The diplopia had appeared suddenly as stated above, following an attack of cervical and occipital pain. Double vision was complained of only for distant objects and did not bother her while doing close work. The patient was wearing before each eye a high compound hyperopic correction of approximately +3.00 D.sph. +2.00 D.cyl. ax. 90°. This distance correction had been the same for many years, and was properly fitted and worn.

The external examination of the eyes and adnexa was negative. Tests of the individual ocular muscles in the six cardinal fields of gaze revealed no lagging nor overaction. The patient maintained binocular single vision on a small receding light from the near point out to one meter. At that point diplopia began and steadily increased up to six meters. The images were homonymous and their separation was not increased or decreased as the test object was moved from the primary position into the various fields of gaze. Therefore no individual muscle paralysis existed .

Tests for the amount of the lateral deviation with the distance correction on, revealed an esophoria of four prism diopters at 33 cm., and an esotropia of twenty prism diopters at six meters.

This was diagnosed as a case of divergence paralysis, caused probably by a metastasis of the carcinoma to the supposed divergence center. The esophoria for near probably had no connection with the lesion. It could readily be explained by the fact that the patient was hyperopic to a considerable degree and very likely had a congenital tendency to overconverge on near objects. The fact that she had had one child with "crossed eyes" tends to confirm the suspected presence of the same heredity factor in the patient herself.

Unfortunately the patient lived at some distance from Saint Louis and has been lost track of since her discharge. In such a case an autopsy following an early death might have given us some more definite clue than we have now regarding the location of the divergence center which several competent authorities claim must exist.

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UNUSUAL SURGICAL LESIONS AFFECTING THE OPTIC NERVES AND CHIASM

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Six uncommon cases of tumor are described with ophthalmological features in all and necropsy findings in two. From The Mayo Clinic, Rochester, Minnesota.

Of recent years increase in clinical material and improvements in methods of exposure have made it possible to define the various changes in the visual fields which are produced by tumors in the vicinity of the optic nerves and chiasm. The study of these data has shown that certain visual syndromes can be differentiated, which may be so clear cut that a preoperative diagnosis can be made, not only of the situation of the tumor, but also of its nature. Familiar examples of tumors producing recognizable visual changes are meningiomas of the olfactory groove, suprasellar meningiomas, and tumors of the hypophysis. The object of this paper is to record a series of cases in which these visual syndromes were produced either by tumors of an unusual pathologic type, or by tumors growing in unexpected situations.

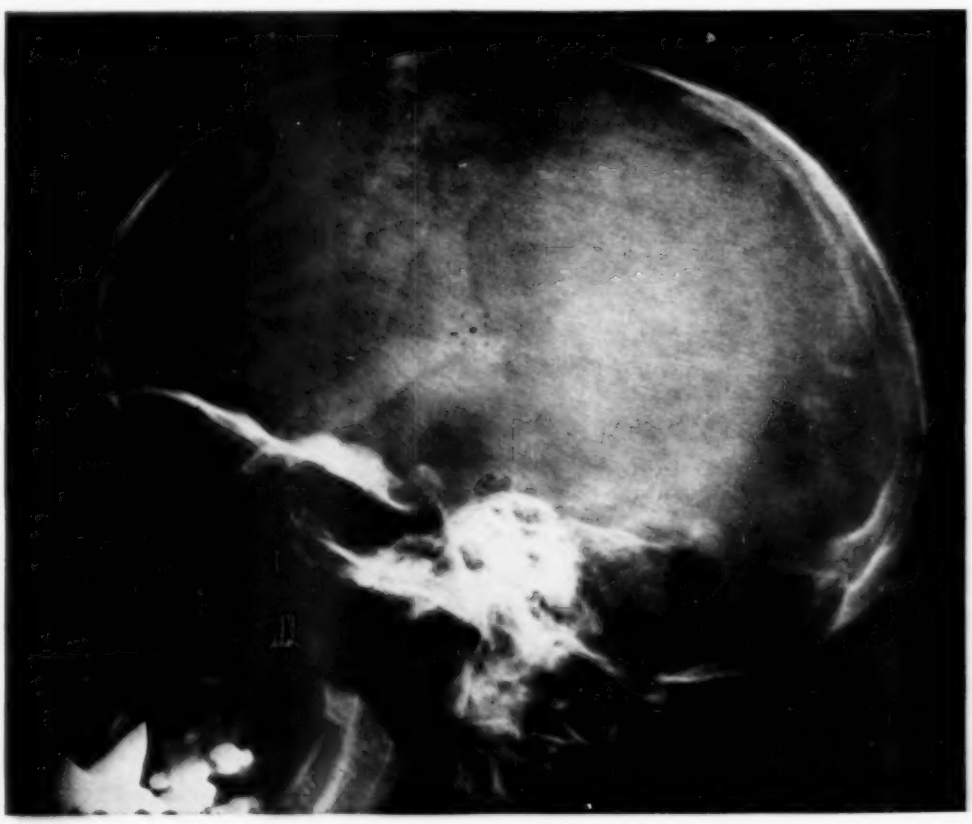


Fig. 1 (Case 1). The area of hyperostosis on the tuberculum sellae.

Group 1: Tumors in which the visual signs were those of a prechiasmal lesion

Case 1: Meningioma en plaque, simulating a basofrontal meningioma. A woman, aged 54 years, came to the clinic because of failing vision. Her past history was essentially negative. Four months before she came, she noticed that when she closed her left eye, vision in her right eye was poor; she had never noticed this defect before.

The general examination was essentially negative. A roentgenogram (fig. 1) of the sella turcica gave evidence of a broad, irregular area of hyperostosis to the right of the midline extending anteriorly on the tuberculum sellae, and crossing to the left side of the sphenoid and ethmoid bones. Ophthalmologic examination revealed the vision in the right eye to be 6/20, and in the left eye to be 6/10. External ocular examination was entirely negative. The fundi were normal. The perimetric field for the right eye showed temporal hemianopsia, with loss of central fixation; for the left eye, the field was entirely normal for form and color (fig. 2). Neurologic examination was negative. A diagnosis was made of basofrontal meningioma, chiefly on the right side, and exploration was advised.

The region of the sella was exposed through a right frontal osteoplastic flap. There was no increase in intracranial tension, and the approach to the chiasm was easy. Just in front of the tuberculum sellae appeared a maroon-colored, vascular looking tumor, stretched across its whole breadth, and passing backward to envelop the right optic nerve, and to rest on the upper surface of the chiasm and left optic nerve. The tumor resembled a carpet with a thick pile. It was found to be so firmly adherent to the right optic nerve that no procedure short of resection of this nerve would permit its total removal; as the patient's relatives would not agree to this, the flap was replaced, after a small opening for decompression had been made at its base. The patient's immediate convalescence was uneventful, and twelve months after operation her general health was excellent and the size of the defect in the visual field had not increased.

Comment: The ophthalmologic syndrome was that of a lesion just anterior to the chiasm, mesially situated, and affecting the nasal fibers of the optic

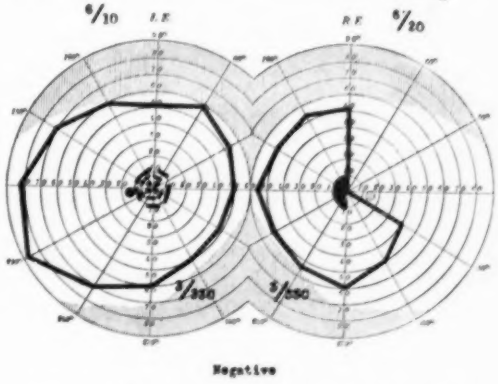


Fig. 2 (Case 1). Perimetric fields before operation.

nerve. To this is to be attributed the unilateral temporal hemianopsia with loss of central fixation. The roentgenogram helped us to estimate the size of the base of the lesion, and the preservation of sense of smell made any anterior extension of the growth improbable. However the flat, spreading nature of the tumor as revealed at operation was rather unexpected, although it may possibly explain the unusual amount of bony reaction, otherwise rarely produced by meningiomas in this situation. A guardedly favorable prognosis was given regarding expectancy of life.

Case 2: Epidermoid cyst between the frontal lobes. A man, aged thirty-one years, came to the clinic because of failing vision in the left eye, and numbness and weakness of the left side of the face. Two years previously, he had dull, frontal headaches which were localized more on the left side. About that time, while he was in bed, he had one generalized convulsion, after which he was unconscious for thirty minutes. One year previous to his admission at the clinic, he noticed that the left side of his face would become numb for a few seconds several times a day, and that vision in the left eye be-

came temporarily blurred. Vision in the left eye became progressively worse. Two weeks before admission, the patient noticed that when he laughed the left side of the face did not move well, and that it was more constantly numb.

The general examination was essentially negative except that a roentgenogram of the sella turcica showed evidence of thinning of the posterior clinoid processes, and of increased intracranial pressure. Ophthalmologic examination revealed vision in the right eye to be 6/10 and in the left eye to be 1/60. The external ocular examination was negative except that the left corneal reflex was somewhat diminished. The ophthalmoscopic examination revealed bilateral choked discs measuring 4 diopters each. The perimetric field of the right eye was normal for form and for color, while in the left eye there was definite nasal hemianopsia for form, with loss of central fixation and inability to recognize color (fig. 3). Neurologic examination disclosed bilateral loss of the sense of smell, and slight muscular weakness of the lower part of the left side of the face. A diagnosis was made of tumor compressing the left optic nerve in front of the chiasm, and exploration was advised.

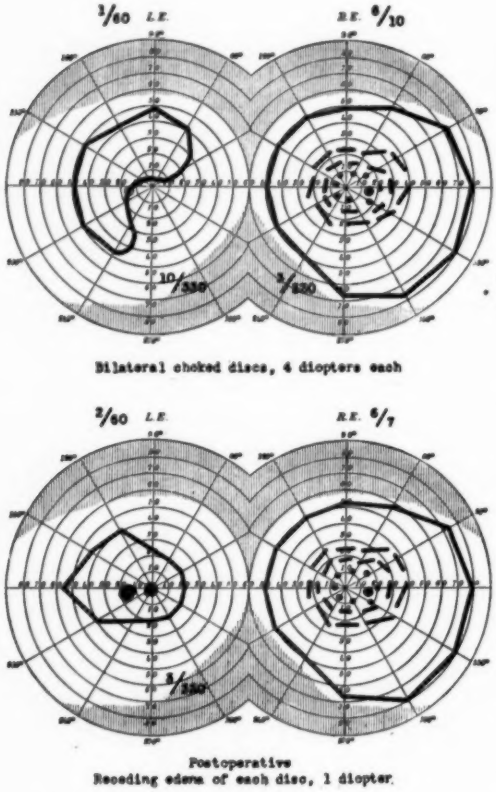


Fig. 3 (Case 2). Perimetric fields before and after operation.

A left frontal osteoplastic flap was fashioned. The dura was extremely tense, and the bone in the temporal fossa was as thin as paper. After the intracranial tension had been reduced by puncture of the vestibule of the left lateral ventricle, a firm area could be felt through the dura, occupying the middle third of the first frontal convolution. On incision of the dura over this area, the membrane was found to be adherent to the rather reddened cortex. A small opening was made through the cortex, and at a depth of 1 cm. a tumor was encountered. This consisted of crumbly whitish material, in small lumps, and proved to be cholesteatomatous in nature. As the growth was obviously of large size, it was decided to divide the operation into two stages. The dura was therefore widely opened, additional bone was removed under the temporal muscle, and the flap was sutured.

Six days later the flap was reëlevated. The diagnostic incision in the cortex was extended forward with the electrosurgical unit, and removal of the crumbly, cheesy material was begun. The cyst extended outward into the beginning of the fissure of Sylvius, and backward along the falx cerebri to the level of the rolandic fissure (Fig. 4). The line of cleavage between the frontal lobes had been displaced to the left. It was found that the tumor extended beyond the middle line, under the arch of the falx. The free border of the falx was therefore divided, to give additional exposure, and the content of the cyst was removed from the right frontal lobe. Here and there parts of the wall of the cyst were found, of glistening appearance and firmly adherent to the pia-arachnoid, especially in the neighborhood of the cortical vessels. The thickest part of the capsule was at the base, in the median line, immediately

in front of the tuberculum sellae; in fact, there it presented the appearance of a stalk of glazed skin. The whole procedure was almost bloodless. When the cyst had been removed, the huge cavity left between the frontal lobes was filled with warm saline solution, and the flap was resutured in position.

Convalescence was uneventful until the twelfth day, when leakage of cerebrospinal fluid occurred at the anterior angle of the flap. This caused some anxiety for a few days, but finally the sinus closed. When the patient was dismissed from observation the swelling of the optic discs had receded to 1 diopter in each eye, and vision had improved in the left eye, with some restoration of the nasal portion of the field; the loss of central fixation in this eye persisted (fig. 3). The patient has been doing the work of his farm, and has been in excellent general health and free from headaches. However, he has had two convulsions, one nine months, and the other a year after the operation.

Comment: The ophthalmologic features were those of a lesion just anterior to the chiasm, laterally placed, and affecting the temporal fibers of the optic nerve. The presence of choking of both discs, as well as the unilateral field defect, is of interest. Direct pressure on an optic nerve is necessary to produce this type of field defect, and, as the lesion was one of long standing, it might have been expected that on the side of the hemianopsia the choking would have been followed by atrophy before the patient came under observation. The prognosis is good both for tenure of life and for restoration of a portion of visual acuity.

Group 2: Tumors in which the visual signs were those of a lesion of the optic chiasm or optic tracts

Case 3: Glioma of the third ventricle. A woman, aged thirty-two years, came to the clinic because of failing vision in both eyes. The patient was well until eight months previous to her examination, when she experienced very severe pain in the right temporofrontal region, followed by an attack of severe vertigo. She found that she could relieve this pain by lying on her back. Following this, she noticed that vision was failing slowly, and during the last two months, she would bump into objects on the left side. For the last month, the relatives and friends of the

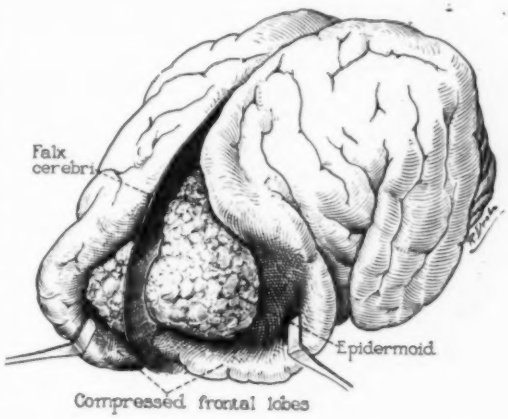


Fig. 4 (Case 2). The approximate position and relations of the epidermoid cyst.

patient noticed that there had been some changes in personality; she became apathetic, and refused to take part in any social activities.

The general examination was essentially negative throughout except for a roentgenogram of the head, which showed evidence of enlargement of the sella, with destruction of the posterior clinoid process (fig. 5). Ophthalmologic examination revealed vision in the right eye to be 3/60 and in the left eye to be 4/60. External ocular examination was negative. Ophthalmoscopic examination showed pallor of the left disc; the right disc was normal in color. Perimetric fields revealed left homonymous upper quadrant hemianopsia, with loss of central fixation in each eye (fig. 6). Neurologic examination was negative throughout. The basal metabolic rate was —10. A diagnosis was made of tumor in the vicinity of the optic chiasm, and exploration was advised.

A right frontal osteoplastic flap was fashioned. The brain was under great tension, and even after the administration of hypertonic glucose solution, the propriety of attempting to expose the pituitary region was doubtful. How-

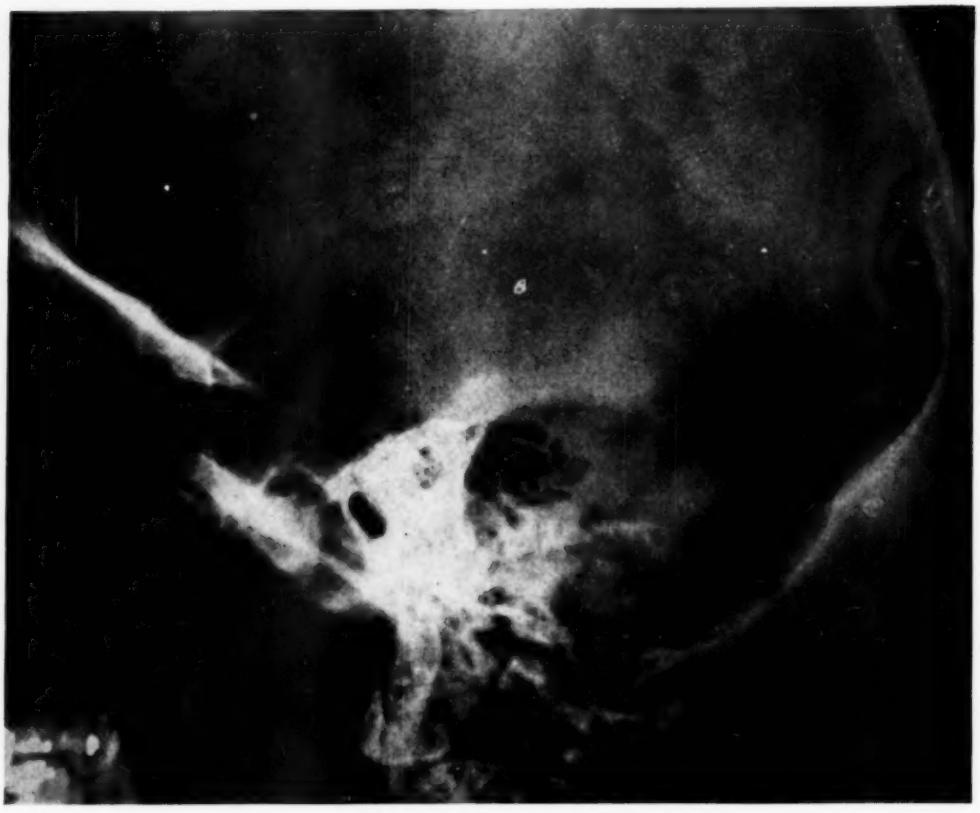


Fig. 5 (Case 3). The enlarged sella.

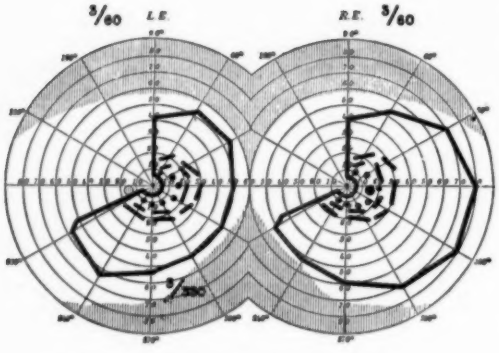


Fig. 6 (Case 3). Perimetric fields before operation.

ever, by elevating the frontal lobe very slowly the pituitary region could be examined. Behind the tuberculum sellae could be seen a large, smooth, dark purple tumor. This obscured the optic nerves and chiasm, and was most bulky on the left side. A portion of the growth was removed, and its histologic picture was found to be that of a glioma. The operation was completed as a decompression.

Following the operation, the patient had partial left hemiplegia, and for the first twenty-four hours the systolic blood pressure remained about 90 mm. The next day the blood pressure rose to 115 mm. and the hemiplegia began to pass off, but toward evening the patient became very drowsy, and, in spite of supportive measures she died suddenly of respiratory failure during the night; the heart continued to beat for some time after she ceased to breathe.

At necropsy both lateral ventricles were dilated, and as a result of the long continued increase in intracranial pressure, the cerebral convolutions were flattened and the sulci dry. The base of the brain was covered by a gray, gelatinous mass of tissue, soft and friable, but nonhemorrhagic, nondegenerating, and noncystic. This mass was evidently tumorous and complete-

ly filled the interpeduncular fossa, surrounding all the cranial nerves from the second to the twelfth pair (fig. 7.) The optic chiasm was completely embedded in its substance. The neoplasm surrounded both the internal carotid arteries, and all the vessels of the circle of Willis, but none of these vessels was compressed or occluded. On both sides the tumor passed laterally along the fissure of Sylvius, over the uncus, and backward over the pons on the superior surface of the cerebellum. It varied in thickness from 2 cm. over the pons to 4 cm. over the interpeduncular fossa. A coronal section of the brain revealed that the tumor invaded and destroyed the various structures in the floor of the third ventricle, except the corpora mamillaria. From there it

Fig. 7 (Case 3). The distribution of the tumor over the base of the brain.

invaded the cerebral hemispheres, passing into the septum pellucidum, the right cerebral peduncle, the inferior portions of the basal nuclei (especially on the right), and the temporal lobes. The optic nerves, optic chiasm and optic tracts retained their identity in the midst of the neoplastic mass, as did the third, fourth and sixth pairs of cranial nerves (fig. 8). There was marked erosion of the sella turcica, which was flattened, and the posterior clinoid processes had disappeared. The pituitary gland was flattened, but the neoplasm had been prevented from in-

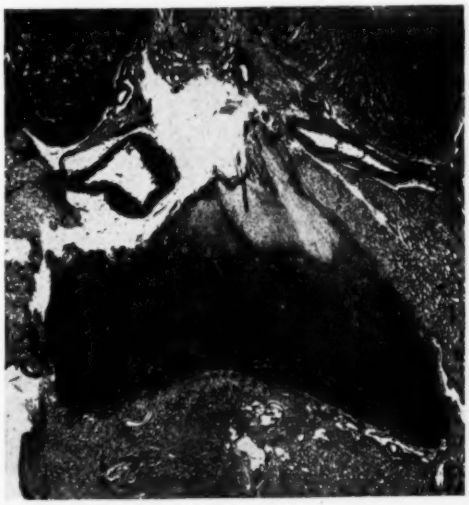


Fig. 8 (Case 3). The optic chiasm. The tumor cells have not penetrated its sheath. There is degeneration of the upper portion and also some milder degeneration of the right side (x6.5). Weigert myelin sheath stain.

vading it by thickening of the diaphragma sellae.

Microscopic study showed the tumor to be a cellular glioma. The cells, which resembled primitive spongioblasts, were uniform in size, with processes at one end which did not taper off but had a "fish tail" like ending. Neuroglial fibrillae were not present, and special stains did not reveal any cell-processes except those already described. Mitotic figures were numerous. Sections stained with Weigert's myelin sheath stain showed that the sheaths of the optic nerves and optic chiasm had resisted the invasion of the tumor cells, and also that the first two-thirds of the optic tracts were not infiltrated by tumorous tissue. There was slight invasion of the inferior border of the right optic tract (fig. 9*a*), where it curved round the cerebral peduncle before entering the geniculate body. In spite of the fact that there was no direct neoplastic invasion of the optic chiasm and first portion of the optic tracts,

there was definite degeneration of their myelin sheaths, especially in the upper portion of the optic chiasm (fig. 9*b*), and upper portion of the right optic tract (fig. 9*a*). The degenerative changes in the tract were much less marked than those in the chiasm, and were diffuse and not complete, whereas those in the chiasm were complete and circumscribed. The blood vessels present in these structures were patent, their walls were normal, and they did not contain any thrombi. The Weigert stain showed that the invasion and destruction of the brain tissue were more marked on the right side than on the left. Glial activity coexisted with the myelin degeneration of the visual fibers. Many cells which contained fat droplets and undegenerated myelin were present, as well as degenerated and swollen astrocytes, and "gemästete" glial cell formation (fig. 9*b*).

Comment: Ophthalmologically, the syndrome of lowered central acuity, pale discs, and a left homonymous quadrant hemianopsia, was that of a lesion affecting the chiasm. The short duration of the visual symptoms, and the absence of any metabolic disturbance associated with disease of the pituitary gland, led us to localize this lesion in the suprasellar region. Necropsy confirmed this, and revealed a much more extensive growth than was realized even during the operation. Although the central end of the right optic tract had been invaded by the growth, the visual defect must be ascribed to pressure on the chiasm, in which a circumscribed area of degeneration was found, which afforded an accurate anatomic explanation of the defect.

Case 4: Cystic tumor of hypophysis, associated with cyst of right optic nerve. A woman, aged 25 years, came to the clinic because of blindness in the right eye and failing vision in the left eye. Eight years previously she began

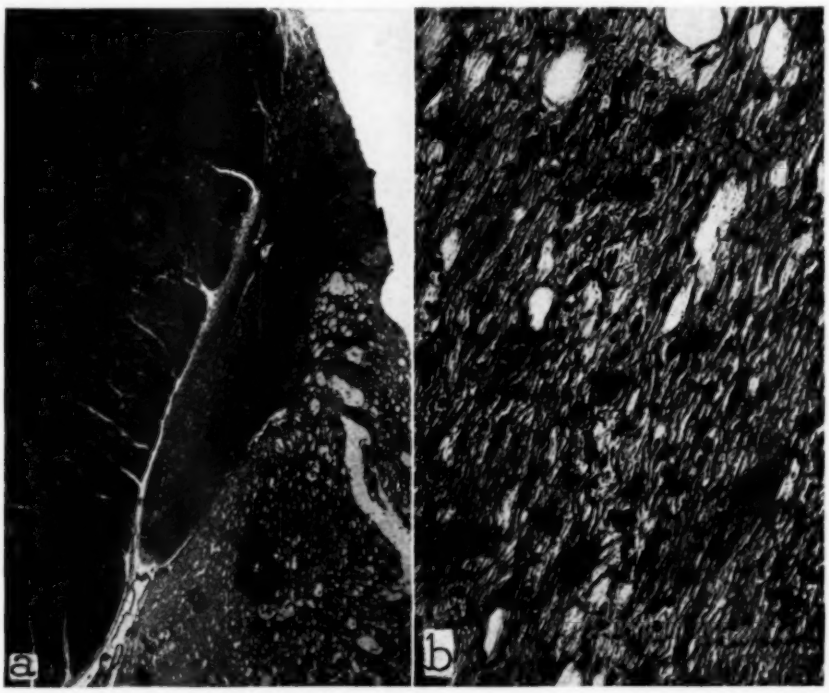


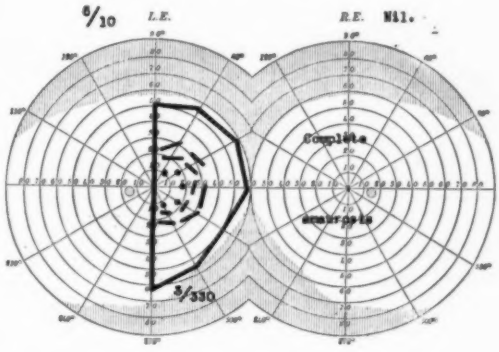
Fig. 9 (Case 3). (*a*). The optic tract curving around the right cerebral peduncle before entering the geniculate body. The tract is definitely degenerated, and the tumor cells are invading it (x7). Weigert myelin sheath stain. (*b*). Definite degeneration of the optic chiasm, with proliferation and "gemästete" glial cell formation. Vacuolation and degeneration of the myelin sheaths are definite (x250). Van Gieson stain.

to drink excessive amounts of water (about eight quarts daily). This polydipsia persisted for two years, and then gradually disappeared. Five years previously, her menses ceased and severe generalized headaches developed. Three years previously, she became nervous, and her vision suddenly became poor; the right eye was completely blind for four days; two weeks later, her vision returned to normal. Since then, the patient had not had much trouble until two months before her registration at the clinic, when the vision in the right eye failed completely and was not recovered. At the time of this loss of vision of the right eye, she noticed that the temporal field of vision in the left eye was almost lost.

General examination was negative, except for a basal metabolic rate of —30 per cent. The roentgenogram of the sella turcica gave evidence that it was enlarged, with thinning of the posterior clinoid processes. Ophthalmologic examination revealed complete amaurosis in the right eye; vision in the left eye was 6/10. External ocular examination was negative. On ophthalmoscopic examination, pallor of both discs was noted, without loss of substance. Perimetric fields confirmed the finding of complete amaurosis in the right eye, and showed complete temporal hemianopsia in the left eye for both form and colors (fig. 10). Neurologic examination was entirely negative. A diagnosis of hypophyseal tumor was made, and exploration was advised.

The pituitary region was exposed by a transfrontal intradural approach. The sella turcica was occupied by a large, bluish cyst, measuring 3 cm. in its transverse, and 5 cm. in its anteroposterior, diameters. When the cyst was aspirated, it was found to be multilocular, the largest pocket containing 20 cc. of fluid. This fluid looked like pus, with some yellowish necrotic material floating in it. Close to the optic chiasm, the right optic nerve presented a cyst, approximately 1 cm. in diameter, from which a little grumous fluid containing some débris was aspirated. After a piece of the dome of the cyst had been excised, the operation was completed following the customary method.

The fluid from the cyst contained degenerated polymorphonuclear leukocytes, with a few cholesterol crystals. It was sterile on culture. The débris from the cyst of the optic nerve contained a few degenerating astrocytes. Postoperative convalescence was uneventful, but at the time of the patient's dismissal there was no change in the perimetric fields.



Simple optic atrophy, right eye. Pallor of disc, left eye

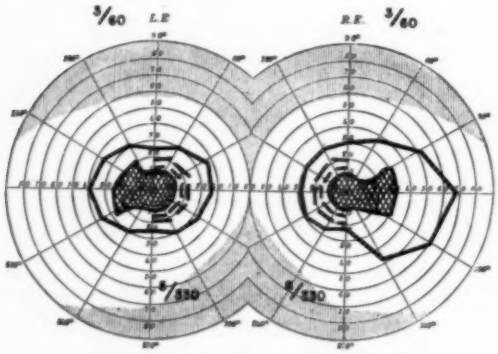
Fig. 10 (Case 4). Perimetric fields before operation.

Comment: The change in the basal metabolic rate, and the ophthalmologic syndrome, were typical of pituitary tumor. The fluctuating character of the visual disturbances suggested cystic formation in the growth. The nature of the intraneural cyst was doubtful, and must remain so. In this case, there is not much likelihood of improvement in vision.

Group 3: Tumors at a distance from the optic chiasm associated with signs of its involvement

Case 5: Tumor of vermis. A boy, aged eleven years, was brought to the clinic because of failing vision and unsteady gait. He was well until four months previously, when he began to be awakened in the early morning by severe headache and vomiting. The headache and vomiting persisted, and about the same time he noticed that vision was failing progressively in both eyes. For the month before he was brought for examination he was unsteady in his gait.

The general examination was essentially negative throughout. A roentgenogram of the head showed the signs of generalized increase in intracranial pressure. The basal metabolic rate was —26 per cent. Ophthalmologic examination revealed that vision in the right eye was 3/60, and in the left eye 3/60. The external ocular examination was negative. Ophthalmoscopic examination revealed bilateral choked discs of two diopters each. Perimetric fields showed concentric contraction for form, with a large cecocentral scotoma in each eye (fig. 11). There was defi-



Bilateral choked discs, 2 diopters each

Fig. 11 (Case 5). Perimetric fields before operation.

nite bitemporal hemianopsia for colors. Neurologic examination was negative except for distinct ataxia, which was not associated with any weakness. The diagnosis lay between a growth in the region of the third ventricle, and a growth in the posterior fossa.

In order to localize the growth, a bilateral ventricular estimation was carried out. Both lateral ventricles were found to be dilated, and indigo carmine injected into one ventricle was readily recovered from the other. In view of this bilateral intercommunicating hydrocephalus, the operation was continued as a cerebellar exploration. At once it was clear that there was a large growth in the cerebellum. When an incision was made into the vermis, a granular, soft tumor was exposed. A portion of this was removed for histologic examination, and was found to be an astrocytoma. In view of the patient's condition, the operation was completed as a decompression, and resection of the tumor was postponed.

A month later the cerebellum was reëxposed. The tumor was found to infiltrate all of the vermis and part of each cerebellar lobe. The tumor was completely removed, save for a questionable fragment anteriorly. After its removal the dilated aqueduct was clearly visible, with cerebrospinal fluid issuing freely from it.

The postoperative course was long and stormy, and for many days repeated cisternal tappings were necessary, to remove the cerebrospinal fluid. However, the circulation of the fluid gradually became reëstablished, and the boy was finally able to go home.

At present, two years after the operation, he is in fair physical condition, but is completely blind.

Comment: The ophthalmologic changes found in this case were those usually associated with tumors of the third ventricle or with suprasellar growths. The bilateral cecocentral scotoma and bitemporal hemianopsia for colors were definite, and easily charted. The headaches, vomiting, and ataxia, without other neurologic findings, as well as the age of the patient, were suggestive of a tumor of the vermis, but we had never observed changes in the perimetric fields in such cases. It was possible that the growth had extended upward into the third ventricle, but evidence for this was not forthcoming at the operation; not only was the third ventricle found to be unobstructed, but also the aqueduct of Sylvius was dilated, which proved that the obstruction to the outflow of cerebrospinal fluid was in the posterior fossa. The possibility of the presence of multiple lesions must be considered: for example, the presence, in addition, of a basofrontal tumor in the median line, extending toward the chiasm, and accounting for the progressive deterioration of vision to complete amaurosis, in spite of the relief of the internal hydrocephalus. However, as the boy is alive and in good general condition two years after operation, the possibility is not very strong.

Case 6: Perineural fibroblastoma of left eighth cranial nerve. A man, aged thirty-one years, came to the clinic because of diplopia. Four years previously, he noticed that hearing in the left ear was gradually failing, and finally he became totally deaf in this ear. Two years before examination, he began to have daily headaches, which varied in intensity and which were usually localized in the frontal region. One and a half years before he came to the clinic he began to have attacks of vertigo and of pain in the back of the neck. Six months before we saw him, he became somewhat ataxic and noticed a tendency to fall to the left at times; at the same time, he began to see double, and he noticed that the left eye deviated toward the nose. Following this, vision in the left eye failed progressively.

The general examination was negative, and in particular the blood count was normal. A roentgenogram of the sella turcica showed that there was a small cystic lesion in the right posterior clinoid process. Ophthalmologic examination revealed vision in the right eye to be 6/10 and in the left eye to be 6/30. External ocular examination disclosed bilateral weakness of the external rectus muscles more pronounced on the left. There was homonymous diplopia laterally on each side. The left corneal reflex was considerably diminished, for the cornea was almost completely anesthetic. Ophthalmoscopic examination revealed bilateral choked discs of five diopters each. The perimetric fields disclosed inferior altitudinal anopsia in both eyes; in the left it was both for form and for colors, and in the right, for color only (fig. 12). There was definite ataxia. A diagnosis was made of tumor of the left eighth cranial nerve.

The left cerebellopontine angle was exposed with great difficulty, on account of the number and size of abnormal vessels which passed from the venous sinuses through the bone to the soft tissues. Tapping a lateral ventricle did not facilitate matters much, as hydrocephalus was not pronounced; this indicated that an unusually large growth was present. Finally the tumor was exposed. It was found to pass forward and inward. Its capsule was incised and much degenerating tissue was removed; however, the growth seemed endless, and we were at last forced to complete the operation as a subtotal removal.

After this interference, the height of choking in both discs fell to four diopters, but the changes in the perimetric fields became more extensive (fig. 12). The patient returned home, but did not progress satisfactorily, so that he was

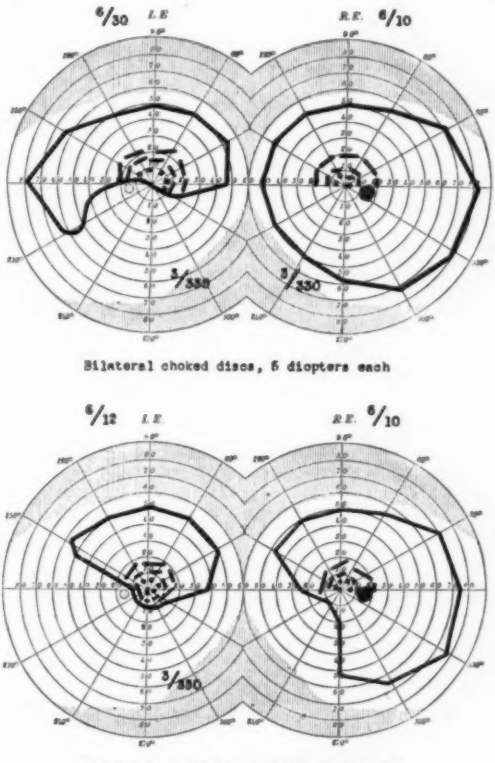


Fig. 12 (Case 6). Perimetric fields before and after first operation.

advised to return for another operation.

Seven months after the first operation it was decided to turn an occipital bone-flap, to divide the tentorium on the left side, and to attempt a more thorough removal of the growth after this wider exposure had been obtained. The perimetric fields at this time are represented in figure 13. The induction

of anesthesia was difficult and prolonged. The elevation of the cerebellar flaps was tedious on account of adhesions between the brain and the new

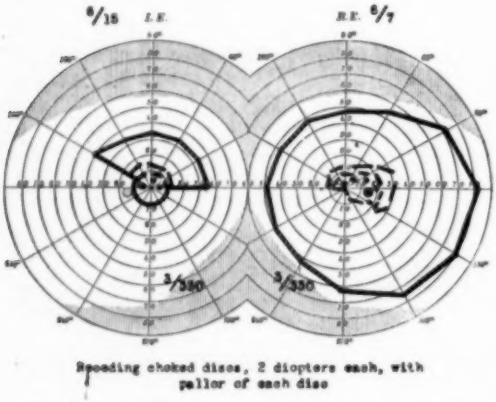


Fig. 13 (Case 6). Perimetric fields seven months after first operation.

dura, and by the time the occipital bone flap was fashioned, the patient's condition was none too satisfactory, and the operation was temporarily abandoned at this stage.

One month after the second operation, a third was performed. Again the anesthetist had great difficulty in securing even anesthesia. Finally the occipital bone flap was turned back, and division of the tentorium was begun, from without inward. Toward the anterior end of the partition, however, it was found that tumor tissue began to be adherent to its under surface, and the original plan of attack had to be abandoned.

The patient died six hours after the operation, from respiratory failure.

At necropsy, gross intracranial lesions were not noted except for the extreme compression and distortion of the cerebellum, pons and medulla oblongata by the tumor, and the moderate internal hydrocephalus. There was no excessive pouching of the floor of the third ventricle as a result of the internal hydrocephalus, and there was no neoplastic tissue in the region of the optic nerves, optic chiasm, or optic tracts. The geniculate bodies and the optic radiations did not contain any gross lesion. There was no acute or

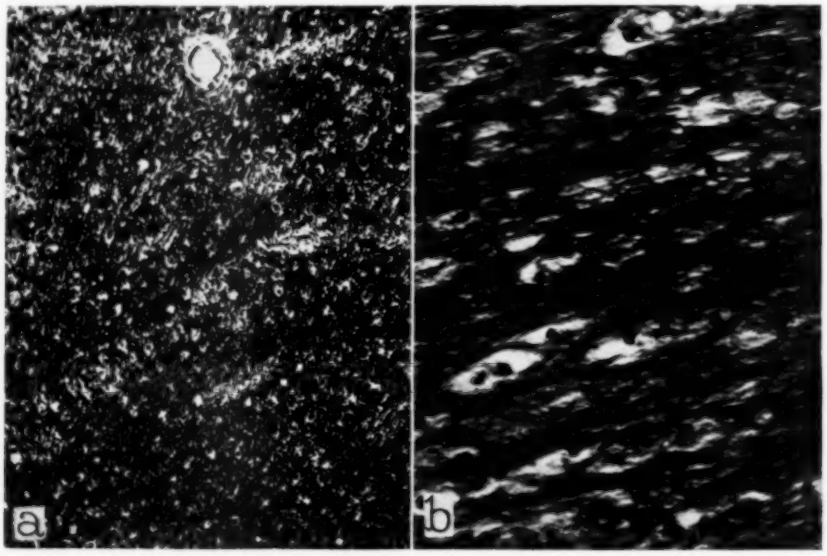


Fig. 14 (Case 6). (*a*). The optic tract, midway between the optic chiasm and the geniculate body, showing the diffuse degeneration of the myelin sheaths, especially in the neighborhood of the blood vessels (arterioles and capillaries) (x100). Weigert myelin sheath stain. (*b*). The optic tract, just prior to its entrance into the geniculate body. There are degeneration of myelin sheaths and formation of scavenger cells (x325). Weigert myelin sheath stain.

chronic inflammatory change present around the base of the brain. Microscopically, the tumor was a perineural fibroblastoma of the eighth cranial nerve. Sections of the optic nerves at their emergence from the optic foramina, of the chiasm, and the optic tracts at three levels between the chiasm and the geniculate bodies were made.

In sections stained with Weigert's myelin sheath stain, there was found an unusual degenerative condition of the myelin sheaths. This occurred in small islands, usually with a small blood vessel in the center of each. The degeneration was most marked close to the vessel and diminished rapidly when traced into the normal surrounding tissue. These foci, which represented an acute process, were scattered diffusely throughout the optic nerves and optic tracts (fig. 14*a*); the degenerative process was still active, as was shown by the presence of many phagocytic or scavenger cells (fig. 14*b*), and some lymphocytes. In the outer sectors of the optic nerves there was evident reduction in the number of myelin sheaths (fig. 15), together with glial replacement; but coexisting with this older process were active changes. The cells in the geniculate bodies were normal. The blood vessels in the regions of degeneration did not show any structural change, and were patent.

The changes affecting the myelin sheaths were similar to those seen in acute multiple sclerosis, except that hemorrhages were not present, and that they were not circumscribed. They also simulated certain of those changes in the brain or spinal cord which accompany pernicious anemia. Thus, no circumscribed defect was found to explain accurately the changes in the visual field, for the lesions in the optic nerves, chiasm and tracts were diffuse rather than local and circumscribed. Finally, no microscopic changes were detected in the optic radiations or area striata.

Comment: Except for the changes in the perimetric fields, the clinical features of this case were those of a tumor of the eighth cranial nerve. Although microscopic study of the visual pathway revealed abundant changes in its structure, these do not account for the clean cut altitudinal nature of the visual defect. In the absence of primary anemia or multiple sclerosis, these histologic changes are unique in our experience. It is unfortunate that the most exhaustive studies do not furnish any anatomic explanation for the ophthalmologic picture, and we can offer no reason for its occurrence.

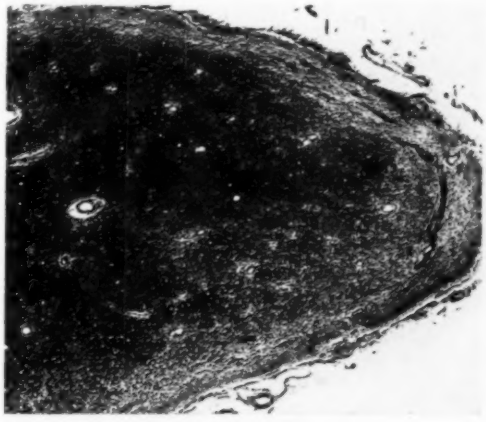


Fig. 15 (Case 6). Right optic nerve just distal to the optic chiasm. There is diminution in the number of myelin sheaths, and gliosis in the lateral segment (x4). Weigert myelin sheath stain.

Summary

Six cases are presented, in which the ophthalmologic features were associated either with tumors of an unusual type, or with tumors in unusual situations. The clinical and surgical features of each case are considered and in two cases the findings at necropsy.

Rochester, Minnesota.

FRAGMENT OF COPPER WIRE IN THE VITREOUS

Report of case

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A case in which a small copper foreign body was removed from the vitreous by direct observation through the pupil is described. An excellent visual result was obtained.

The following case is reported on account of the unusual character of the accident, the penetration of the sclera by a minute piece of copper, the fortunate discovery of the foreign body in the vitreous, the exact localization of the foreign body by the roentgenologist and the successful removal of the foreign body from the vitreous with preservation of useful vision.

Intra-ocular foreign bodies have the property of exciting a chemical reaction within the eye resulting in degeneration of the tissues of the eye.

Theodore Axenfeld states in his text book that the severest reaction of this kind is caused by fragments of copper. Cases are reported in which copper has penetrated the eye and has remained in the ocular tissues for some time.

W. A. Schwartz[1] reported fourteen cases in which copper was retained within the eye with a vision varying from 20/20 to 15/100. The ultimate outcome in these cases is not known.

Franklin and Cordes[2] reported a case in which a piece of copper 3 mm. square remained in the eye for forty-six years. Enucleation was then required on account of sympathetic irritation in the other eye.

Hardy[3] reported a case having one copper fragment in one eye and two in the other. There had been no evidence of disintegration after four years.

Shahan[4] reported a case of fragment of dynamite cap lying in the vitreous four and one-half years at which time an enucleation was required.

Riemer[5] reported a case of a boy having a portion of dynamite cap in his eye. Verhoeff suggested it might be solder and not copper.

Several cases in which fragments of copper were retained in the eye for a number of years are mentioned in the German literature[6], but in most of these cases destruction of the eye or discoloration of the tissues of the eye resulted.

Case: Miss I. H. aged twenty-five years was injured on June 30, 1930 being struck in the right eye by a piece of copper wire. She was engaged at the task of winding radio coils. These coils are made of copper wire of thirty-one gauge, wound on bobbins. These bobbins as they are wound revolve at a speed of 5,000 revolutions per minute.

The patient stated that frequently the copper wire was broken while being wound and that small pieces of the wire snapped and flew. It is interesting to note that this soft metal snapped and the small fragment traveled with sufficient velocity to penetrate the sclera of the patient's right eye. The fragment of copper was a sliver 2 mm. long. The patient was examined at the Factory Hospital by Dr. Carleton who recognized that there was a penetrating wound of the eye and sent her directly to the roentgenologist for localization of the foreign body, and then to my office.

Examination of the right eye showed a lacerated wound of the conjunctiva 1 mm. long, 5 mm. to the nasal side of the cornea. The lens was clear and uninjured. In the vitreous, approximately 11 mm. below the visual axis, could be seen a small mass of blood.

The patient was referred to the hospital and sent immediately to the operating room. By this time the plot of the localization of the foreign body had been received showing it lying 11 mm. back of the center of the cornea 11 mm. below the center and 1.5 mm. to the nasal side of the vertical meridian. A one per cent solution of novocain with adrenalin was injected into the orbicularis muscle along the upper and

lower margin of the orbit and at the outer canthus, also under the conjunctiva below the cornea. The conjunctiva was further anesthetized by dropping a four per cent solution of cocaine into the cul-de-sac. An incision 2.5 cm. long was made transversely in the conjunctiva 5 mm. below the cornea. The conjunctiva was dissected downward by sharp dissection to the sclera, the hemorrhage being controlled by pressure and adrenalin. A "V" shaped incision 3.5 mm. long was then made in the sclera with a Graefe knife 5 mm. below the limbus in the vertical meridian. A Kalt capsule forceps was then inserted into the scleral wound. The light from an electric ophthalmoscope was focused through the pupil. By means of this illumination the fragment of copper and the tips of the forceps could be distinctly seen and the former was then seized by the forceps. The copper was withdrawn without difficulty through the scleral opening. The only vitreous lost was the small amount withdrawn with the forceps and this was clipped off. The conjunctival flap was drawn up over the scleral wound and sutured with three silk sutures.

The patient made an uneventful recovery and was discharged from the hospital on the twelfth day following operation. The eye was kept under the influence of atropin for four weeks.

The vision of the eye is 6/15 and with +1.25 sphere +0.50 cylinder axis 180° is corrected to 6/7.5. The eye has remained perfectly quiet and the patient is back at her work after being off 62 days. The only evidence left of her injury is the inverted "V" shaped scar in the sclera below the cornea.

Summary: Although copper fragments may be tolerated in the eye for some time, they cause degenerative changes in the tissues, discoloration of the same, and may set up irritation in the fellow eye. It is not uncommon for small pieces of hardened steel or pieces of copper, following the explosion of dynamite caps, to penetrate the sclera of the eye, but it is unusual for a very small piece of soft metal such as copper to be thrown off a revolving spool with sufficient velocity to penetrate as resistant a tissue as the sclera.

The character of this accident shows that one cannot be too careful in the examination of the eye following what might be considered a minor accident and one in which penetration of the eye was thought impossible.

A skillful roentgenologist can locate a small foreign body with great accuracy in a coöperative patient.

With clear media and careful technic the removal of intra-ocular non-magnetic foreign bodies is possible.

1701 Medical Arts building.

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DIVERSIFIED THERMOPHORE THERAPY

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The history of the thermophore is reviewed and the method of application described. Fourteen different conditions for which the instrument has been successfully used are cited.
From the Department of Ophthalmology of the Washington University School of Medicine.
Read before the Texas Society of Ophthalmology and Otolaryngology, December 6, 1930.

It is now fifteen years since the thermophore was first devised by Dr. William E. Shahan[1,2], and it seems fitting to outline the different conditions in which this instrument has been found to be of value, together with suggestions as to the method of application.

The instrument, as now manufactured, is so constructed that the contact surfaces, of various sizes and shapes, may be heated from room temperature to 220 degrees F. Useful temperatures so far have been found to be between 130 and 158 degrees F. It is of importance to understand that these temperatures refer only to nickel plated brass. The same purposes would not be accomplished by other metals heated to the same degrees unless these metals had similar conductivity to the nickel plated brass conduction points used in the thermophore.

Regarding the application of the instrument, a few considerations apparently still need stressing. In the first place *contact* is essential. This must be firm, continual and even. There is almost no radiation so that this instrument is worthless if an attempt is made to use it similarly to a heated copper ball.

The question of the safety of the instrument has been brought up occasionally so that a word on this matter might not be amiss. The temperatures recommended have all been most carefully standardized by animal experimentation and have been used a great many times on man without any damage so that we feel perfectly safe in recommending it. It is true that thin and bulging corneæ from pneumococcus or similar ulceration may perforate when the thermophore is used at 158 degrees F. for one minute, but this would probably follow cauterization or the natural course of the disease irrespective of therapy. To explain one or two corneal sloughs which have been reported to me personally, I would suggest either that the cornea was in a precarious condition prior to the application or that some accident had occurred to the thermophore, for example, the thermometer may have slipped away from contact with the conducting applicator so that the proper amount of heat was not being recorded. I have seen no such accident but could conceive of this rare possibility. The instrument in the later models has been rendered almost proof against such occurrences as this.

Anesthesia is a matter of great importance in the use of the instrument. The elimination of pain is necessary for the uninterrupted application. Usually for temperatures below 150 degrees F. as applied to cornea or conjunctiva, cocaine five per cent, instilled three times at three minute intervals, is sufficient. For higher temperatures a subconjunctival injection of one minim of this solution at the limbus in addition to conjunctival instillations will render not only the cornea but also the iris and ciliary body anesthetic. In children, gas anesthesia may be necessary. For skin application a subdermal injection of two per cent novocaine will eliminate pain. For corneal or conjunctival application it is essential that the lids be held well away from the applicator as the lid margins do not share in the anesthesia.

I wish to stress most strongly that the contact surface must cover the entire surface of the area to be treated and must be held firmly against the lesion for the exact amount of time suggested, uninterruptedly, the thermometer showing within one degree of the temperature recommended *throughout the entire application.* If it is impossible

to cover the whole lesion with one application a second one and a third or fourth if necessary should be made to the untreated areas, exactly the same technique being employed for each area. Two applications to one spot for a half minute at 158 degrees F. are by no means the same as one application at 158 degrees F. for one minute. Interruptions are usually because the patient is experiencing pain, therefore adequate anesthesia is an essential.

Before particularizing about the conditions suitable for thermophore therapy, a few words about the reason for the temperatures chosen might be valuable. These depended on establishing the thermal death points. The following is a partial list of those worked out by Dr. William E. Shahan and the author[3,4].

Corneal epithelium	130 degrees F. for one minute
Conjunctiva	145 degrees F. for five minutes or 160 degrees F. for one minute
Epithelioma	140 degrees F. for one minute
Iris (as applied through cornea at limbus)	145 degrees F. for five minutes or 160 degrees F. for two minutes
Xanthoma	150 degrees F. for one minute
Pneumococci	152 degrees F. for one minute
Skin	160 degrees F. for one minute

Little need be said here about the experimental work performed in connection with the thermophore. The appended bibliography covers this subject. Two pieces of work, however, might be referred to as they may have a remote clinical bearing.

In 1921, Dr. Shahan and the author published a series of forty cases of chronic simple glaucoma, treated by application of a contact surface, seven by four millimeters, astride the limbus, heated to 145 degrees F. for five minutes.[5] The tension was reduced from 15 to 20 mm. hg (Schiøtz), this reduction persisting from one to two months, with gradual return to previous hypertension. As the method was not curative and seemed to present little if any advantage over other methods, it was abandoned. No harm was done in any case and as long as persisted in, seemed effectual in limiting the progress of the disease. One case was so treated for two and one-half years. It was not useful in very late cases and had no effect whatever in reducing tension in glaucoma absolutum.

In 1922, it was shown that experimental iris sarcoma could be destroyed by thermophore application through the limbus at 160 degrees F. for one minute[6]. Dr. William H. Luedde treated a patient for rapidly growing tumor of the ciliary body and iris with extension through the sclera, by thermophore application over the tumor. The growth retrogressed and the patient, after two years, showed no evidence of recurrence. This case is to be reported in full by Dr. Luedde.

Following is a summary of various conditions in which the thermophore is of value. Illustrative cases were included in the verbal presentation of this paper but are omitted here in the interest of economy of space.

(1) **Corneal ulcer.** (a) Pneumococcus[7, 8, 9, 10, 11, 12, 13, 14]. A contact surface is chosen which just covers the ulcerated area. This point is placed in the thermophore and the set screw manipulated till 158 degrees F. is indicated constantly on the thermometer. The eye is anesthetized by instillation and subconjunctival injections. The contact surface is then held steadily against the ulcer for one minute. The eye is bandaged, atropine instilled and the patient permitted to go home. Generally the pain from the ulcer will be relieved in from 8 to 10 hours. If at any time in the next few days pain returns, it usually means that a small colony of organisms, as evidenced by a grey or yellowish area at one edge of the wound, has survived the first application. Another application in exactly the same manner as the first should be made in this area. Usually the ulcer is clean 24 to 48 hours after the first application, and healing is uneventful.

(b) Aseptic corneal ulcers. Most of these ulcers heal more rapidly after ap-

plication of the thermophore from 135 degrees F. to 145 degrees F. for one minute than with any other therapy.

(2) **Epithelioma**[15]. The types especially amenable to treatment are those which are not markedly infiltrated. Those which are firmly attached to the deeply underlying structures are less so. This is obviously because the amount of heat necessary to destroy epitheliomata does not penetrate more than a millimeter or two below the surface. Preliminary to the application, novocaine, two per cent, is injected below the lesion. The thermophore is then applied to the entire area at 145 degrees F. for one minute. In case the whole tumor is not destroyed at the first application, other applications to still active areas must be made in exactly the same manner as the first.

(3) **Epibulbar epithelioma**[15, 16, 17, 18]. This type of growth has yielded wonderfully to the thermophore. After anesthesia, application is made to entire tumor at 140 degrees F. for one minute. If the mass is larger than 10 mm. in diameter it is wiser to treat only part of the tumor at a time, 10 mm. being about the maximum because of the reaction. A second application can be made as soon as this subsides, usually in from three to four days.

(4) **Naevi**[15]. Conjunctival naevi are treated in the same manner as epibulbar epitheliomata and yield equally well.

(5) **Xanthomata.** After two percent novocaine injection, the thermophore is applied at 150 degrees F. for one minute to the entire lesion. Pressure must be firm against underlying tissue. A scab will form and will desquamate in about a week and with it a part of the xanthoma will disappear. A second scab will form and even a third, each time the xanthoma becoming smaller. The final appearance will be a delicate flesh colored scar about one-tenth the size of the xanthoma. In cases of small xanthomata no scar will remain. I think that Dr. James Bordley of Baltimore, was the first to use the thermophore in these cases. In some cases a second applicaton is necessary.

(6) **Marginal corneal infiltrations.** This group comprises a variety of conditions from those which are acute with considerable conjunctival hyperemia and irritation of the eye, confined chiefly to the middle layers of the substantia propria, the infiltration being grey or yellow, extending from the limbus to three or four millimeters toward the pupil, usually occupying one-fifth to one-third of the periphery; to the chronic, dense almost white infiltrations of sclerosing keratitis, the lesions in these latter occupying all the corneal layers, extending in tongue-like projections from the limbus, progressing slowly with little inflammatory reaction or irritation. The thermophore should be applied for one minute at 145 degrees F. In the long standing cases a repetition may have to be made after three or four weeks.

(7) **Diffuse corneal infiltrations**[19]. In this group I include aseptic, grey infiltrations in the substantia propria, of the subacute type, in appearance similar to congenital luetic interstitial keratitis. Though I have no personal experience with those of luetic origin, Dr. E. H. Cary, in discussion of this paper before the Texas Ophthalmological and Otolaryngological Society mentioned three cases of this type in which he had used the thermophore and felt that it had materially shortened the course of the disease in the cornea. In one case he applied the thermophore to the second eye not yet affected and in this case the second eye did not become involved. Here again 145 degrees F. for one minute is the accepted dosage.

(8) **Disciform keratitis.** Dr. William H. Wilder, in a personal communication reported the successful use with the thermophore in two cases of this disease. Temperature used was 140 degrees F. for one minute. The author has not used the thermophore in this condition.

Dr. Edgar S. Thomson reported, in 1917, a case of disciform keratitis which had been treated for six weeks without the slightest benefit, to which he then applied the thermophore at 160 degrees F. directly over the disciform spot for one minute[20] The eye began to whiten at once, hypopion was ab-

sorbed and the patient was out of the hospital in a week.

(9) **Dendritic ulcers.** The thermophore used at 145 degrees F. for one minute has been of considerable help in hastening the healing of typical dendritic ulceration in many cases. There are some, however, that do not appear to be benefited by this treatment. Where successful I believe the scarring to be less than by most other methods of treatment. At the 1930 meeting of the American Academy of Ophthalmology and Oto-Laryngology, Dr. Ralph I. Lloyd reported a case in which other treatments having failed thermophore therapy was promptly successful.[21]

(10) **Ring ulcer**[22]. This rather unusual type of ulcer is so distinctive that it has seemed permissible to classify it separately though it probably is not a clinical entity. Ulceration begins about two millimeters from the limbus and extends around the cornea, the horseshoe shape finally becoming a circle, leaving only a small clear central area which soon becomes involved. These ulcers are sterile, deeply infiltrating and practically invariably destructive to vision. The thermophore at 145 degrees F. for one minute has been effectual in stopping the lesion. Here, as always, the application must be made to the entire ulcer. If the ulcer has formed a complete circle many applications will be necessary to cover the entire area because no hollow center, circular contact surface is provided with the instrument.

(11) **Marginal chalazia**[23]. The three by four millimeter long, by one or two millimeter high infected granuloma at the lid margin is a very troublesome thing to cure. The thermophore at 145 degrees F. for one minute has proved very helpful in treating these lesions. Anesthesia here is somewhat difficult because contact of the applicator with the skin is sure to take place so that instillation anesthesia must be accompanied by skin infiltration.

(12) **Lardaceous deposits on cornea**[15, 23]. This is a rather rare condition in which a slightly depressed area extending from the limbus toward the center of the cornea is occupied by a lardacious infiltration which shows vacuoles under the slit lamp. Scraping will be followed by recurrence. The thermophore at 145 degrees F. for one minute is effectual.

(13) **Pterygium.** The author has had no experience with the use of the thermophore in this condition, being inhibited by the experience that dense tissue in general has not yielded to thermophore therapy, but several personal communications have been received stating that the thermophore at 145 degrees F. for one minute was valuable in destroying those pterygia which were just beginning to pass on to the corneal margin.

(14) **Pannus.** Dr. E. H. Higbee[24] treated a severe trachomatous pannus with the thermophore at 140 degrees F. for one minute. Twenty-four days later the pannus had entirely disappeared; no other treatment was used. The author has not used the thermophore for this condition but thinks it might be of value. In trachoma of the lids and in severe vernal conjunctivitis with pebbly formations on the conjunctiva of the upper lids, no benefit has been derived.

Though the thermophore is a very special instrument and has a limited application, it undoubtedly has a broader field than is usually appreciated. The conditions cited above give a fair idea of some of the lesions in which the instrument may be successfully used and further experiments will probably develop other uses for it.

524 Metropolitan building.

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EPIBULBAR NEVO-CARCINOMA WITH ALMOST TOTAL CORNEAL INVOLVEMENT

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AND
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A case of this condition is described with pathological report. The sections suggest that possibly most of the tumors described in the literature as epibulbar melano-sarcomas are really nevo-carcinomas.

The cases of epibulbar tumors described in ophthalmic literature are too numerous to permit making a complete bibliography. Hence we refer those interested in this subject to the work of Panas[29 and 30], who published the bibliography up to 1894; Lagrange[14] to 1901; Morax[24] to 1926; and, among Spanish ophthalmologists, Menacho[20], Tello[34], Wieden and Vinarta[44], and Ribas, Valero[31], who with their valuable studies, contributed much to clarify this matter.

Though there are a great number of cases published, there are not many which give complete and demonstrative observations of their histological structure; therefore, authors disagree about its clinical forms, considering all these types of tumors as leuco- or melano-sarcomas, while others classify them as epitheliomas, or melano-epithelio-sarcomas. In the absence of convincing anatomo-pathologic examinations many cases have been described as melano-sarcomas which could not be accepted as coming under this classification by impartial critics. Therefore, we think it desirable to publish the cases which we observed without omitting any clinical or histopathological details which might bring further knowledge or enlightenment to this important subject, as being the only way to clear up this point of precise pathology in the field of ophthalmology.

Since Van Münster, after Panas[29 and 30] in 1868, emphasized the etiological importance of the pigmentary spots in the limbus in the development of epibulbar tumors, authors have been investigating the subject, and there are several authors who believe that most of these limbus tumors, described as melanotic or pigmented epitheliomas, are nevic tumors.

Panas[29 and 30], after a critical analysis of all the cases coming within his own observations, declared himself convinced that the so-called melanotic sarcoma of the limbus is exceptional, and that the dominant type is cancroid epithelioma. "Undoubtedly", he says, "fibroblastic elements, pigmented granules, and numerous vessels are added, without such addition subtracting anything from the significance of the cancerous follicles found". "What seems to have misled many histologists", continues Panas, "regarding the real carcinomatous constitution of tumors of the limbus, forcing them to describe these tumors as sarcoma, is the co-existence of sarcomatous elements in the tumors of rapid and voluminous development, originated from the irritation of the epithelial nest in the mucous dermis and in the episclerotica.

This author, following the lead of Van Münster, who, in 1868, mentioned the etiological importance of pigmented spots in the limbus, concedes much importance to small pigmentary nevi and all his personal investigations led him to the conclusion, "that tumors of the conjunctival limbus, pigmented or not, are in reality of the epitheliomatous or cancroid type, the origin of which in some cases goes back to infancy, and they are due to malignant transformation of the afore-mentioned nevi".

Though it was not unknown, the nevic origin of tumors of the bulbar conjunctiva, as Monthus[23] states, had not been called to the special attention of ophthalmologists until a few years

ago. To sustain his view, he enumerates the communications of Offret and Clunet (1912-13)[6]; the work of Beauvieux and Muratet (1913)[2]; of Mentrier and Monthus (1913)[21]; Wieden and Viñarta (1913)[44] and Mle. Borch (1914)[4]; and of Van Duyse (1923)[37 and 38].

Duclos[10] and Mawas in the same year and at the same session of the French Ophthalmological Society, contributed a paper stressing the nevic origin of epibulbar tumors. Veil[41] also, confirmed in his thesis, the opinions sustained by the other authors, and stated that he considered melanotic cutaneous cancers of nevic origin analogous to epibulbar tumors, regarding them as epitheliomas of the same origin. He maintained that most tumors of the limbus described as pigmented epitheliomas and melanotic sarcomas were, in reality, nevic tumors.

The normal ocular conjunctiva is covered superficially by a layer of stratified epithelium, integrated with cylindrical basal cells with large nuclei in its deeper generatory portion, polygonal cells superimposed in several rows in its middle layers, and flattened pavement cells on its surface.

The basal cells and those of the middle layer are found with round pigmented granules, more abundant in the basal cells, the middle layer containing fewer, with some isolated granules in the superficial layer. This disposition is found in dark-complexioned people in the zone not protected by the eyelids; and also in colored people.

According to Wolfrum[47], mentioned by Olga Borch[4], there exist almost always in the subconjunctival tissue, subjacent to these pigmented conglomerates, aggregations of nevic cells, which the author considers as the intermediate state between the normal and pathological epithelium; but they are not always congenital, and may develop at any moment of life.

What is congenital is the disposition to form nevi, which is recognized in the strong pigmentation of the basal layer of the conjunctival epithelium, and following the conclusions of the author, the point of origin of malignant tumors of the conjunctiva lies more often than is generally believed in these pigmentary conglomerations; or rather, in the nevic cells which accompany them.

The deep part of the perilimbic conjunctiva is divided into two zones: The first, superficial and subepithelial is formed of very delicate reticulated connective tissue which is easily infiltrated by leucocytes, presenting in some parts, papillae similar to those of the skin. This layer was named the adenoid layer by Villard[42]. The second zone, resistent, represents the termination of the capsule of Tenon and forms the support of the vessels and nerves.

As the bulbar conjunctiva at the limbus has the same structure as that of the skin, undoubtedly new epithelial malignant formations can be developed in it, similar to those found in the external tegument, such as the pavement epithelioma and the nevo-carcinoma.

For this paper, we are interested only in the second type, and our study will be limited to nevo-carcinoma.

The nevi, according to Darier[7 and 8], are circumscribed deformities of the skin, of embryonic origin, or evolutive, supervening at any age and are of very slow development.

Histological examination reveals that they consist of an infiltration of the dermis by globulous or polyhedral cells, with large nuclei, and abundant protoplasm. They are frankly epitheloid, isolated and deposited in nests, columns, and various aggregations. They are the nevic cells which are sometimes pigmented.

Virchow thought that they were young connective tissue cells; Demierville thought that they were endothelial cells originating in the endothelium of blood vessels; Recklinghausen claimed they originated in the endothelium of the lymphatics. Unna[35] has demonstrated that they are epithelial cells, and with him most authors now agree. They originate from the mucous body of the epidermis by granulation and strangulation of the intrapapillary prolongations.

The histological structure of the nevo-carcinoma is very typical. The

neoplastic elements are globular or fusiform, sometimes pigmented in places, disposed in well-defined compact mass, in poorly-limited trabeculae or alveoli; sometimes the appearance is exactly similar to those of the melano-sarcoma where the cells are of the same nature as the nevic cells, derived from the epidermis by segregation and falling to the dermis.

This author, referring to the nevic carcinomas of the skin, states they are nevo-epitheliomas and not sarcomas, notwithstanding that, according to a theory revivified by Masson[25 and 26], nevo-cancers would be formed by melano-blasts and might evolve into nevo-epithelioma, nevo-sarcoma or melano-sarcoma.

Veil[40 and 41], agreeing with the opinion of Unna and other investigators, says that the histological characteristics of nevic tumors, which he always found in cutaneous tumors as well as in conjunctival new formations are: Segregations of epithelial cells, isolated or in groups, forming in the epithelium and also in the dermis; conglomerations of nevic cells of epithelial origin in nests, as nevic characteristics, and as characteristics of malignant transformations of the same, the reappearance of the phenomena of segregation, presence of kariokinesis, giant cells, invasion both at surface and at depth of the tumoral cells, phenomena of cellular metaplasia giving to the deeper layers of the tumor a pseudo-sarcomatous aspect. These tumors, more or less pigmented, contain a connective vascular stroma, the importance of which increases according to the reaction of defense.

Morax[24], as well as the other authors before mentioned, recognizes the modality of structure and similar evolution to the cutaneous nevi, and points out the difference which exists in those developed in the conjunctiva due to the nature of the mucosa. In the skin the intraepidermic nodules when they sink into the dermis, remain in coherent mass, though they can suffer considerable metaplasia in their elements. The nevic nodules of the conjunctiva, when they migrate into connective tissue, can remain coherent and form epithelial cords or columns, but they may afterwards become cystic by fusion of the central elements, a matter which is not strange in the epithelial nodules of mucosa which contains clear muciferous cells.

The disembrioplasias of the bulbar mucosa (a name adopted by Duclos[10] and Mawas from the disembrioma proposed by Letulle designating the tuberosous nevi) have the characteristics of being able to contain cysts as well as the property of implanting coherent conglomerations of nevi cells in the connective tissue.

These authors in the third conclusion of their paper state that in the disembrioplasias of the conjunctiva the continuity of the epithelial columns and cords of the dermis with the mucosa is certain, that they have observed it always, and affirmed its identity by the presence of mucous cells; but in the connective tissue and outside the zone of progression of the nests of epithelial mucosa, there exists an independent conglomeration of cells which does not yield to the fusion of the central elements, and in which the presence of mucous cells cannot be discovered.

Of course, these are nests of nevi cells and the authors ask themselves, whether these cells have originated from epithelial elements, or whether they are of some other species. In this manner, the authors put the question as to whether the nevic elements lost in the epithelial layer as well as in the dermis are of epithelium or connective origin; an interesting problem inasmuch as these cells, when they have malignant characteristics, it is recognized, are able to engender epitheliomas or sarcomas. The authors are inclined to believe, following Menetrier[22], that the nevi are complex congenital malformations, hyperplasia of which can, equally, contain nodules of connective tissue or epithelial elements.

From the histological structure of the nevic carcinoma, most authors have pointed out the polymorphism in the structures of the nevic neoplasms.

The interpretation of the phenomena has been the object of discussion between the supporters of the theory of connective tissue origin, and the partisans of the other theory, i.e., that the epithelial cells are the mother elements of the neoplasia. For the former, the nevic tumors are melano-sarcomas; but for the latter, according to the predominance of epithelial cells or connective tissue, as both intervene simultaneously, they might be sarcomas, epitheliomas, or mixed tumors.

Other authors, Darier[7] among them, claim that such phenomena are the most perfect expressions of metaplasia; this author having observed many cases which in the intermediary zone between the portion of the tumor which is nevic or carcinomatous in structure, and that which offers the structure of fasciculated sarcoma, the gradual transformation of the aggregation of the general forms of the cells and of their nuclei, where it is possible to determine quite clearly that the fusiform cells which appear sarcomatous are derived from the epidermis. Following the criterion of this author, sarcoma developing at the expense of the nevi does not exist, though it seems evident to him that certain neoplasias, being tumors of epithelial nature can take, occasionally, the appearance of fasciculated sarcomas.

Regarding this question of the dualism of nevic tumors, Olga Borch[8] says, "It seems logical to us to invoke the phenomenon of cellular differentiation described by Chamby as the consequence of his cultures of the tissue in vitro; he seems to have demonstrated that always when cellular elements of any nature are isolated or detached from the influence of the organism, they tend to multiply indefinitely, losing, little by little, their specific characteristics until they arrive at a form impossible to identify from a histological standpoint. He mentions the example of cells from the tubules of the kidney which, when cultivated outside the organism, grow up, taking first the aspect of indifferent epithelial tubes; therefore they conserve the general characteristics of epithelial cells but they lose the peculiar characteristics of cells of the kidneys, and when they invade the plasm, depending upon the condition of the medium; they are round or fusiform elements which do not differentiate in any form from the elements of connective tissue origin, or from the ones obtained under the same conditions from other organs".

In her magnificent study of nevic tumors, this Russian authoress finds it perfectly logical that the same thing might happen in any of the tumors that we are studying; when the nevic cells are not controlled by the regulatory action of the organism they proliferate and differentiate and arrive at an indifferent state that gives them the aspect of sarcomatous cells.

Considering that we ignore completely the nature of the regulatory action of the whole organism, upon the different cellular elements which form it in order to maintain it in a state of perfect and constant equilibrium, it is impossible in the actual state of our knowledge to suspect the conditions which suppress or weaken it in a limited point of the same, the point where the problem of malignant tumors is located.

Case Report

A. C. A., female, 62 years of age; native of Logrono, Spain.

History: Patient came to the clinic, April 28, 1930, to be treated for a growth developing in the left eye. The patient had had no illness worth mentioning. In her family there had existed no antecedent of neoplastic disease. Three years ago the condition actually began with the forming of a little red spot located in the external limbus of the left eye. This spot remained stationary in size for two years. Patient did not follow the advice of her family doctor, who, at that time, advised the removal of the little growth, which the patient considered of no importance.

For the last year, the affection took an invading form, and grew over the cornea quite rapidly until the patient presented herself at the clinic for treatment.

Examination: The cornea is almost totally involved with the growth, there being only a small sector, of about 4 x 4 mm. on the nasal side, exempt, The tumor extended from 3 mm. outside the limbus on the temporal side, occupying the whole cornea (Fig. 1) above and below, to the limbus which seemed to offer, eccentrically, a wall of resistance to the progression of the tumor. Toward the nasal side the tumor was prolonged in form of two horns which also reached to the limbus on this side, leaving the very small area of exempt cornea, above mentioned.

The tumor is flattened in the form of a plate, extending uniformly in surface, elevated over the level of the cornea, about 2 mm. in the central part where it is most prominent. It is of whitish color, slightly pink in some places, and of medium consistence and lardaceous aspect, intimately adherent to the cornea.

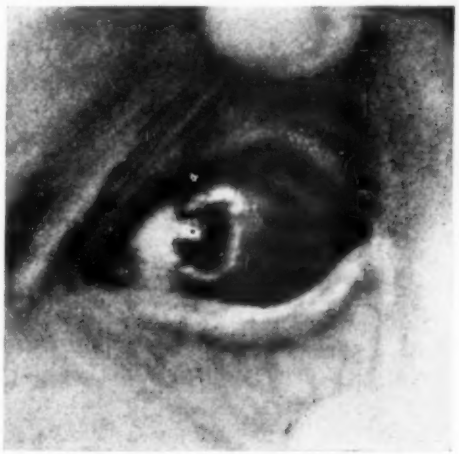

Fig. 1 (Castroviejo). Photograph of the affected eye.

Biomicroscopic examination: Brownish striation is detected on the tumor, especially marked on the inferior part; the episcleral vessels are dilated. Through the healthy cornea, the iris is seen, apparently normal, but does not react to light nor to mydriatics. Neither in the limbus nor in the conjunctiva are seen pigmentations. There are no infarcted glands. The patient has experienced no pain, and vision is limited to light perception only. Digital tension seems to be increased + + but the tonometer cannot be used on account of the irregularity of the surface.

Clinical Diagnosis: Considering the brown lines seen on the surface of the tumor, a diagnosis of probable melano-

Fig. 2 (Castroviejo). Cross section of the eye showing the position of the tumor.

sarcoma of the cornea-conjunctiva was made.

As the process was too extensive to permit of a conservative operation, the patient was advised to have the eye enucleated, which operation was performed May 5, 1930, with extensive resection of conjunctiva surrounding the tumor. The patient returned to the clinic September 6, 1930, in perfect condition; and again on November 1, 1930, with no signs of recurrence of a malignant nature in the left orbit.

The eye was fixed in formaldehyde, 10 per cent, and Mueller's fixing fluid, half and half; included in celloidin, and serial sections made in the vertical antero-posterior plane. The sections were stained with hematoxylin-eosin, Van Gieson, triple stain of Cajal (picrofuchsin, and indigo-carmine), Mallory, and some others. The celloidin was dissolved in alcohol and ether, equal parts, the sections were kept for 24 hours in formaldehyde 10 per cent and were then

stained by the method of Rio Ortega (ammoniated carbonate of silver).

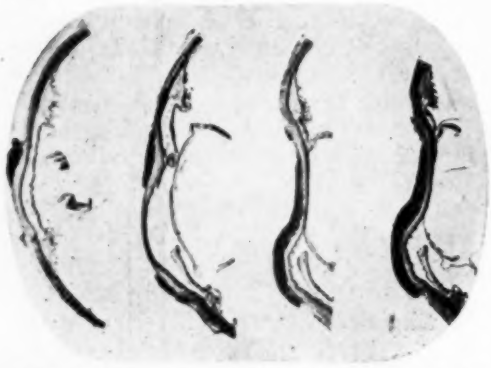

Fig. 3 (Castroviejo). Serial sections of the eye showing progression of the tumor to the cornea, and also the complete anterior and posterior synechia of the iris in the upper part.

Microscopic examination shows that the tumor is located on the surface of the cornea (Figs. 2 and 3), and is made up of a connective tissue stroma of alveolar structure (Fig. 4) enclosing in its net-work polymorphous cells. The cells contained in the alveoli form lobules, and are variable in form—some small and rounded; others polygonal; and others frankly fusiform; all of varying size; the nuclei have a tendency to be spheric, though some are elongated and angular. Among these cells are observed some with rounded nuclei and melanotic pigment, uniformly spread in the protoplasm of the cell (Fig. 5).

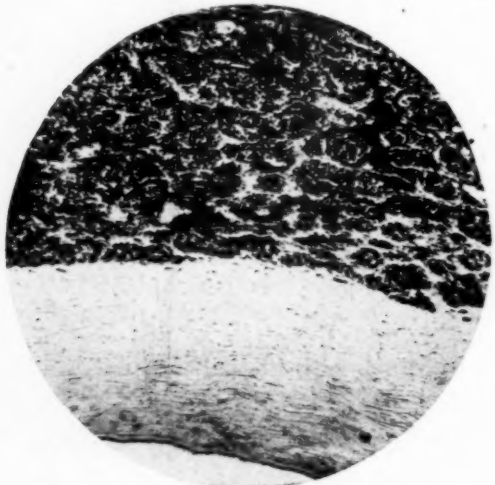

Fig. 4 (Castroviejo). Aspect of alveolar melanosarcoma in the central part of the tumor mass.

The connective tissue which forms the tumor is constituted of collagen and reticuline, the latter penetrating between the cells of the lobules and forming a very thin net-work. There are also observed fusiform cells in the connective tissue, as well as melanotic cells, in which the pigment is accumulated in larger quantities than in those of the lobules, and to such an extent that, in some places, they appear as pigmented conglomerates in which it is very difficult or impossible to distinguish the nucleus.

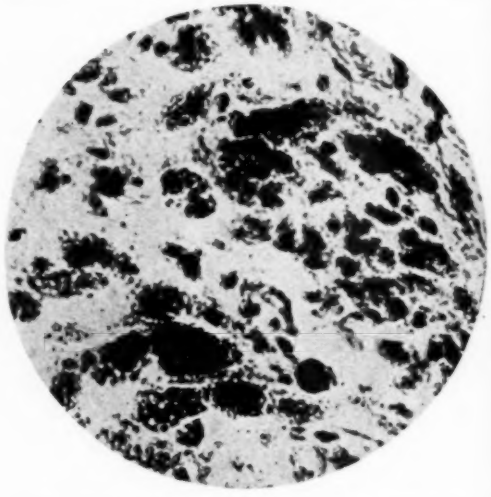

Fig. 5 (Castroviejo). High magnification of pigmented cells of the tumor.

In the network of connective tissue there exist a few vessels with proper walls (Fig. 6), which do not traverse the tumor lobules, but remain perfectly limited to the stroma of the tumor.

The neoplasm extends superficially from the limbus on the temporal side toward the cornea, respecting Bowman's membrane in almost its whole extent, this being broken through in only a few places where the connective tissue of the tumor continues without limit with the substantia propria of the cornea (Fig. 6). The surface of the tumor is covered by a thin layer of

epithelial cells, most of them keratinized.

On the temporal side, in the small area of conjunctival invasion, the tumor seems to be inactive, appearing in the form of fine infiltrate, of leucocytes and rounded tumor cells very much like those found in the inflammatory tissue (Fig. 7). This zone is characterized by the infrequency of cellular mytoses, and an aspect of inactivity which is also found all along the periphery of the tumor, above and below

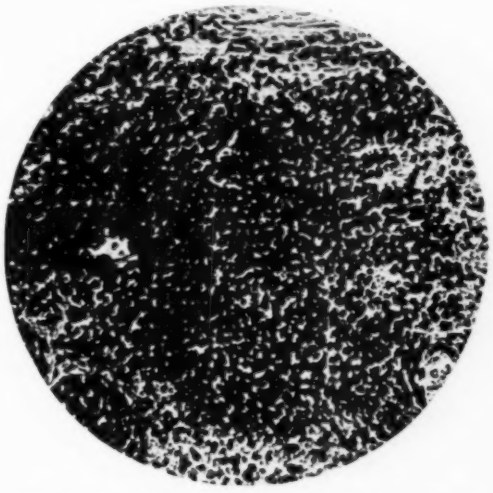

Fig. 7 (Castroviejo). Section on the periphery of the tumor toward the temporal side to show its similarity to inflammatory tissue.

Fig. 6 (Castroviejo). Rupture of Bowman's membrane and continuity of connective tissue with the substantia propria of the cornea. Cross section of vessel in the stroma.

(Fig. 8) in the limit of demarcation from the normal tissue which is the corneal conjunctival limbus that seems to offer, eccentrically, a barrier to the progression of the tumor. When we arrive at the nasal side where, microscopically, are observed the two horns or wedges of progression of the tumor, the aspect changes; cellular mytoses are observed in much greater numbers; the tumor does not progress any more between the epithelial cells and Bowman's membrane, but is exclusively intraepithelial (Fig. 9), and the tumor cells do not push the epithelial cells from the eccentric progression of the tumor as might be expected, but on the contrary, the epithelial cells, as if they were possessed of positive chemotaxis toward the tumor cells, are directed towards them, the nucleus elongated, increased in volume, and presenting atypical cellular activity with the number of mytoses as numerous as are found in the tumor cells of the progressive zone of the tumor.

In this epithelial zone, coming from the normal epithelium where the cells are disposed to assume regular rows,

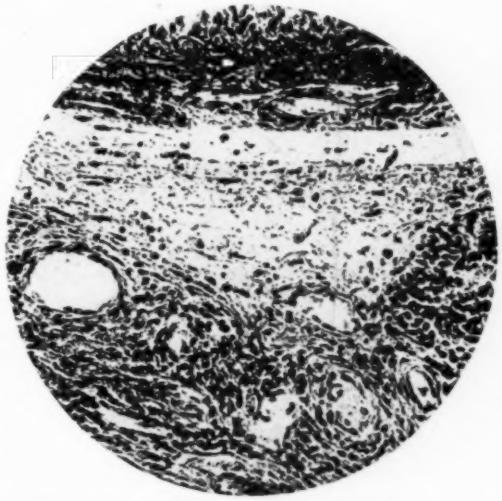

Fig. 8 (Castroviejo). Peripheral portion of the tumor above and below, showing the resemblance to infiltration tissue.

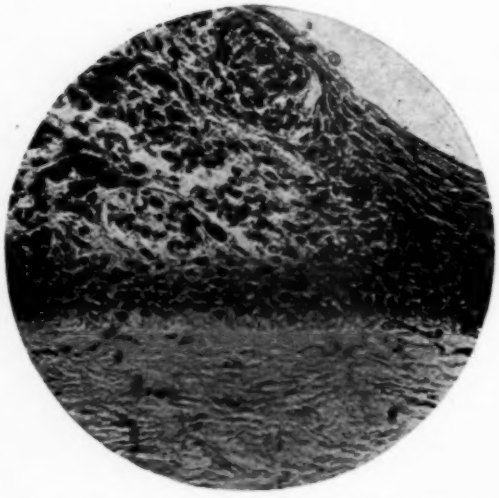

Fig. 9 (Castroviejo). Intraepithelial growth of the tumor; increased thickening of epithelial layer, with the formation of a tumor lobule.

six to eight in number, perfectly distributed in basal cells, polygonal cells in the medium layer and flat superficial cells have undergone atypical transformation. The rows increase in number, lose their regularity of distribution, and are directed toward the tumor mass as if they were attracted by it (Figs. 9 and 10).

In the epithelial cells of this zone

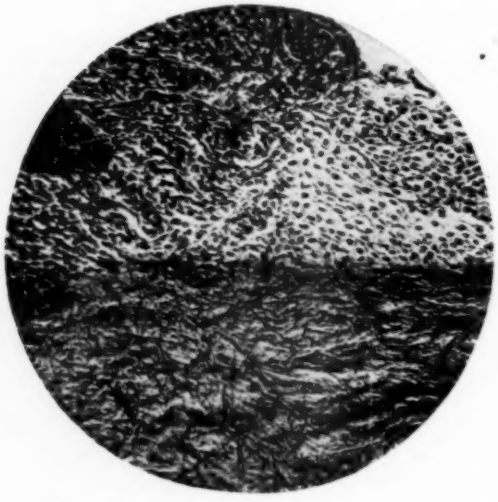

Fig. 10 (Castroviejo). Interlacing of epithelial columns and tumor cells, showing carcinomatous aspect. Notice the increased thickness of epithelial layer.

there can be observed two different evolutions. In some are observed exaggerated cellular activity, the number of mytoses increasing, and protoplasm undergoing a proteic-like degeneration, being filled with minute granules visible by narrowing the diaphragm of the microscope which gives them a more distinct outline due to their great refringent power. These granules pass through different shades of color acquiring first, a yellowish tone, and, afterwards, brown. (Figs. 11-12-13).

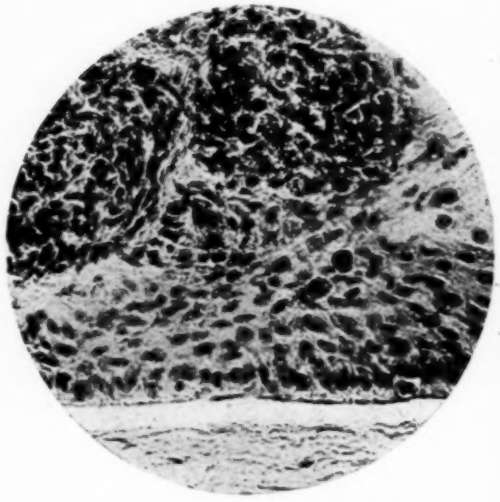

Fig. 11 (Castroviejo). Two pigmented cells in the middle of the epithelium of the cornea close to the tumor mass.

The cell is isolated from its neighbors, forming around it a sort of vacuole, or else it is accompanied by some others with or without pigment and implanted within the tumor forming a sequestrum-like mass, which is immediately surrounded by connective tissue, thus forming a tumor lobule (Figs. 9-12-13).

In these lobules of recent formation, the cells mostly resemble epithelial cells, inasmuch as some of them are epithelial cells without any transformation as yet.

Reticuline fibers infiltrate among the cells which become polymorphs. These pigmented cells are not different from the cells of the nevi, and are observed in greater number in the basal and medial layers of the epithelium, and in

epithelial cells in contact with the tumor. (Figs. 11-12-13).

Some cells are seen gradually transforming from normal epithelial cells into pigmented cells, and adding to the tumor mass, without following the sequestrum-like mechanism above described (Fig. 13).

The superficial cells of the epithelium do not seem to take an active rôle in the formation of the tumor cells, but limit themselves to a secondary rôle of covering the tumor, experiencing a

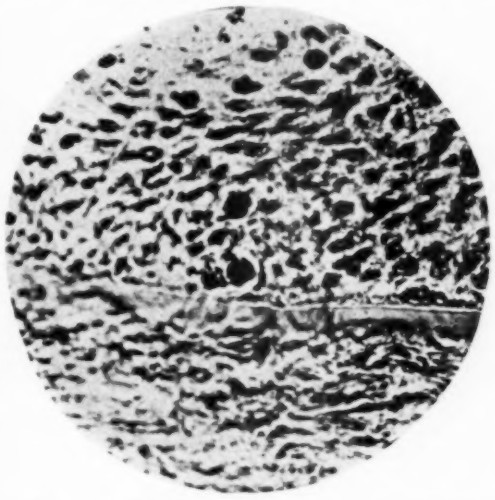

Fig. 12 (Castroviejo). Pigmented epithelial cells in the basal layers of the corneal epithelium.

sort of keratinization, like the superficial cells of the tegumentary epithelium.

In part of the zone of the epithelial layer in contact with the tumor, the cells increase considerably in volume and reach a size two or three times larger than that of the normal cell. They appear edematous, with the protoplasm swollen; the nucleus also increases slightly in volume and the whole cell becomes paler, undergoing, too, the same transformation as the cells of the tegumentary epithelium. They seem to keratinize, losing the nuclei and infiltrate themselves within the tumor, mixing with the connective stroma (Fig. 14 and 15); yet not all of them experience the same degree of evolution; some acquire pigment or are

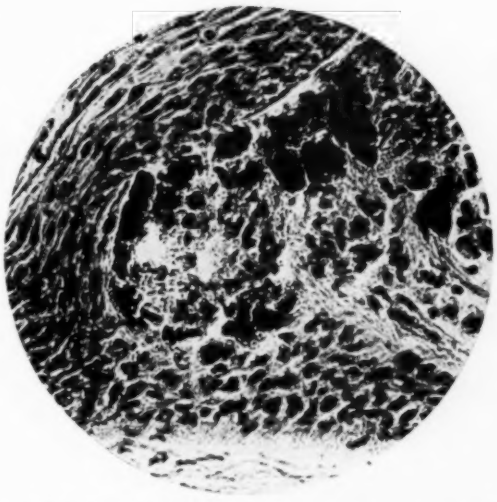

Fig. 13 (Castroviejo). Zone of progression showing accumulation of pigmented cells, and its gradual transformation from normal epithelium into tumor cells.

transformed into melanic or melanotic cells. In some places in these zones of progression, the interlacing between the epithelial cells and the tumor cells is found in such shape that it looks very much like a mixed tumor in which epithelial cells infiltrate a sarcomatous neoplasm (Fig. 10).

In the rest of the eye the following

Fig. 14 (Castroviejo). Formation of epithelial tumor nests in the zone of progression of the tumor. Notice infiltration of keratinized epithelial cells into the neoplastic mass.

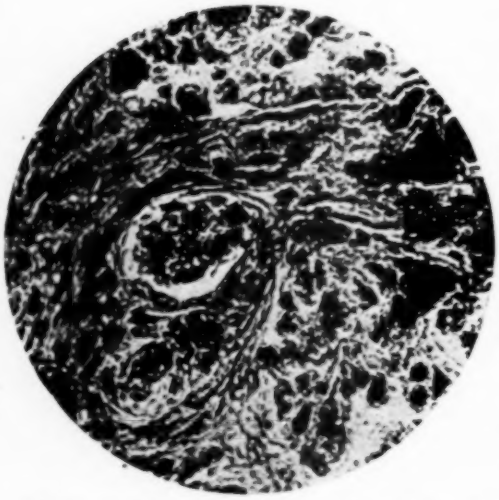

Fig. 15 (Castroviejo). Same as figure 14, but with greater magnification.

is found of interest: The canal of Schlemm is poorly developed, being completely absent in places (Fig. 16). In the upper nasal side, the iris is found strangled between the cornea and the lens, having been reduced to a thin black membrane with complete atrophy of the stroma, and also marked atrophy of the pigmentary epithelium due to the adherence of the lens to the iris, and of the latter to the cornea. The posterior chamber has disappeared

Fig. 16 (Castroviejo). Irido-corneal angle showing absence of Schlemm's canal.

here, and the anterior chamber also, with closure of Schlemm's canal and the spaces of Fontana (Fig. 2-3-17). The lens presents a few subcapsular opacities. The ciliary muscles and the ciliary body present no signs of pathology, nor does the rest of the eye.

Conclusions: First: that the pigmented cells found in the epithelium are not different from the nevic cells. Therefore, it is logical to suppose that these cells, located always very superficially, and near the epithelium, might be epithelial cells detached into the connective tissue.

Second: That all the melanic cells in the tumor proceed from epithelial cells, those found in the tumor lobules as well as those existing in the connective stroma.

Third: Study of the zone of propagation of the tumor and the successive

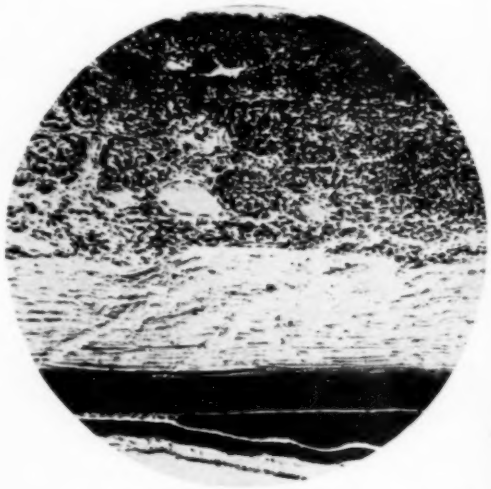

Fig. 17 (Castroviejo). Anterior synechia showing strangulation of the iris between the lens and the cornea. Above, in the connective tissue of the stroma of the tumor, is seen the cross-section of a vessel.

transformation of the epithelial cells show that it is not a tumor of connective tissue origin but purely epithelial.

Fourth: That the tumor has its probable origin in one of the nevic cells of the limbus (as seems to be demonstrated by the clinical history), with successive transformation of the rest

of the epithelial cells of the cornea, and belongs, therefore, to the type called nevocarcinoma.

Fifth: That in most, if not all of the tumors described in the literature as epibulbar melano-sarcomas, it might have been possible to demonstrate after a careful microscopic examination, details of structure which would permit of their classification under the type herein described.

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IRIDENCLEISIS FOR GLAUCOMA WITH APHAKIA

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In the several cases described, iridencleisis was resorted to for relief of glaucoma arising in eyes which had undergone cataract extraction by the usual methods with capsulotomy.

In a number of cases of chronic glaucoma, I have used the iridencleisis technique described by S. R. Gifford[1] with much satisfaction. A Holth punch sclerectomy was combined with it in some of the more exaggerated cases as described recently by Greenwood[2]. When confronted with glaucoma in an aphakic eye iridencleisis was therefore decided upon.

Chronic noninflammatory glaucoma that follows cataract extraction may be caused by retained capsule and lens débris as described by Knapp[3]. Needlings may also be a factor, as shown by Peter[4] and by Hardy[5]. I have not yet encountered it where an intracapsular extraction was performed.

Case 1: Mrs. S., aged seventy-nine years; poor health, heart with poor compensation, nephritis. She had had an iridectomy and capsulotomy cataract extraction of the right eye three years before I saw her. There had been no needling. Glasses were fitted two and one-half weeks after the operation and gave good vision. The left eye was in fair condition at the time the right was operated on, but began to fail rapidly about two months afterwards. With it she could see light until six months ago. About this time the patient fell and struck her forehead on a chair; but there was no eye injury.

There had been some discomfort around the right eye ever since the operation; the globe was tender to touch. Vision had gradually failed. There has been some discomfort around the left eye also, but no actual pain unless the globe was touched; then it was very sensitive. There was no history of inflammation except prolonged postoperative hyperemia of the right eye.

Examination: Right eye aphakic, good central opening in capsule but iris adherent to large capsule remnants on both sides and above (figure 1). Narrow anterior chamber, with iris and capsule remnants pushed far forward. Cornea slightly opaque above from epithelial activity. Corrected vision, 8/30.

The left eye had a large pupil that did not react to light or accommodation; shallow anterior chamber; Morgagnian cataract; the lens was dislocated and tilted slightly backward at the top. No light perception. Tension (Gradle-Schiøtz) right, 47 mm., left 66 mm.

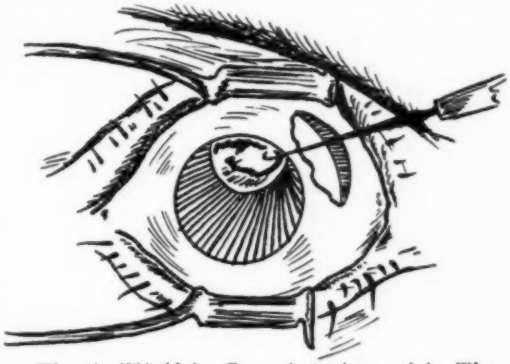

Fig. 1 (Wolfe). Case 1 (schematic). The white body behind iris represents capsule and débris. Exaggerated in size. Hook turned forward in this case to catch capsule and iris.

Right motion field narrowed markedly. Test unsatisfactory for colors. Diagnosis: right, secondary noninflammatory glaucoma; left, absolute glaucoma.

Operation, January 2, 1930; right, modified S. R. Gifford technique. A large conjunctival flap was dissected to the limbus on the temporal side. A keratome incision was made into anterior chamber at the extreme corneoscleral junction. The iris and lens capsule were caught with a very small hook and brought into the wound, twisted and then incarcerated in the lower end of the incision (figure 1). The iris was very fragile. On account of the iris being pushed so far forward the hook was turned forward to catch the iris (figure 2). A small piece of

sclera was removed with a Holth punch. The wound was closed with a water-tight suture.

The anterior chamber reformed in three days. There were moderate operative hyperemia and some pain for two or three days. Ten days afterward tension was 26 mm. (Gradle-Schiøtz). Ten months afterward the eye was free from pain; right vision, 20/30 corrected.

A trephine or Holth punch operation

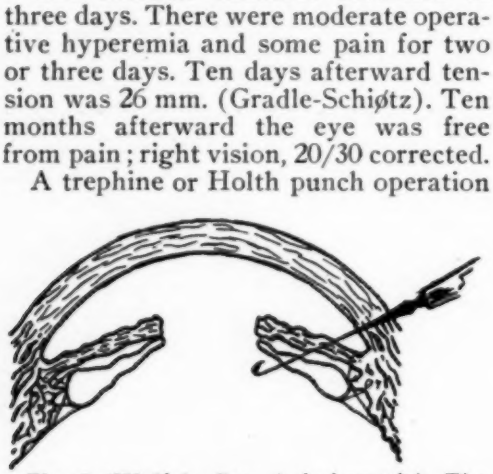

Fig. 2 (Wolfe). Case 1 (schematic). The black ink marking in anterior chamber represents capsule. The capsule and iris were brought into lower end of incision by the hook.

was planned for the left eye but was not performed as the patient's heart condition was alarming. An internist gave active cardiac stimulants before and after the operation. A posterior sclerotomy was hastily performed and the patient was returned to her room.

Case 2: Mrs. C., aged fifty-nine years, a diabetic. Blood sugar was very high but was reduced by diet. Insulin had been used several times. Vision of both eyes began to fail six years ago. Four years ago, before I saw her, a capsulotomy cataract extraction was performed on the left eye. Four needlings were performed in the two-year period following. The eye was never comfortable. A first correction was given one year ago, or three years after the operation; this gave her 18/70 vision.

The right eye had a senile cataract with vision of 18/100. The left eye had anterior and posterior capsule on the upper and nasal side of the pupil with a fair central opening; it was 2 mm. nasalward from the center of the cornea. There was a slight engorgement of the ciliary vessels, but no history of active inflammation except after the several surgical procedures. Tension (Gradle-Schiøtz) right 26 mm., left 32 mm. at first examination and 35 mm. at second test.

An iridencleisis was performed as in case one, except that no capsule was included with the iris. The anterior chamber was of normal depth, so the iris hook was turned backward. The iris was drawn into the wound and incarcerated at two to three o'clock on the temporal side. This enlarged and replaced the pupil to the center of the cornea. Considerable débris was set free in the anterior chamber. This was absorbed slowly but the eye cleared rapidly. Three weeks later the tension was 22 mm. (Gradle-Schiøtz). The operative hyperemia has cleared and the eye is entirely comfortable. Vision left, corrected, 18/30 plus.

The right eye has since had an intracapsular cataract extraction by the Barraquer technique. Vision, counted fingers three days after the operation; two weeks later it was 18/30. Clear black pupil; convalescence uneventful.

Preliminary report on two additional cases: The results are satisfactory so far. A fifth case was operated on but no report can be given except that it appeared satisfactory when the patient left our care.

Mr. H., age seventy-four years, had noninflammatory glaucoma and nuclear sclerosis with subcortical opacities in each eye. The tension on first examination was R. 22, L. 48 mm. (Gradle-Schiøtz). Vision, corrected, R. 20/100 plus; L. 20/100 minus. The right peripheral field was narrowed perceptibly. The left peripheral field was very small.

A double iridectomy was performed at once. Eight days later, the left cataractous lens was removed under a large flap. An intracapsular extraction was attempted but the capsule ruptured. Three weeks later, the tension in the left eye was 30 mm. The operative hyperemia, however, was clearing slowly. Five weeks after the operation, the corrected vision was 20/70 or 10/40. Seven weeks after the operation, the tension in the left eye had risen to 42 mm. Iridotasis was performed, the Holth punch being used to remove a piece of sclera. The eye made a slow but un-

eventful recovery. The anterior chamber was reëstablished on the eighth day. Four weeks after the operation, the tension in the left eye was 20 mm. On examination nine weeks after the operation, the tension was 20 mm. The vision in the left eye was 18/70. The right eye has also shown some improvement in vision but no change in tension or field.

The last case is too recent for a report of other than preliminary results. Mr. K., aged sixty-three years, had been blind in the right eye since childhood from atrophy of the globe. The left eye had had a capsulotomy extraction of cataract fifteen years previously. He could see newspaper headlines with correction for five years, but had had recurring attacks of pain or discomfort of increasing severity for the last three years. His vision since then had gradually failed to dim light perception at two feet. The projection test was poor. Examination showed a contracted pupil filled with capsule and encapsulated lens débris. The tension was 35 mm.

In this case also the Holth punch was used in addition to the iris inclusion technique. We were able to remove part of the capsule and débris with forceps but a large amount of lens substance remained. This is slowly being absorbed and the eye is clearing. There is no pain. Eight weeks after the operation, he can distinguish the outline of furniture and movement at four feet. The tension by palpation is normal.

Comment

Secondary glaucoma following cataract extraction is rather common. Not infrequently, patients who obtain a fair to good result lose vision later from secondary glaucoma. In these five cases, and several additional ones observed, capsule was present.

The iris hook is more efficient than the forceps. If the anterior chamber is primarily shallow or becomes shallow after the keratome incision, the hook can be rotated either way to grasp the iris and capsule. One entry is sufficient. It causes less gaping of the wound and less loss of vitreous than forceps. A water-tight suture is used to prevent prolonged hypotony.

In cases of glaucoma with hypertension and cataract, the iris may be incarcerated at the primary cataract operation under a large conjunctival flap, as I described before the American Academy of Ophthalmology and Otolaryngology in 1930.

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THE CLINICAL VALUE OF ANGIOSCOTOMETRY

A system of central field study

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Refined technique for exact mapping of angioscotomas and other defects of the central field are recommended because of the information thus afforded for the purposes of clinical diagnosis.

The primary object of this paper is to show the clinical value of the theory and technique of angioscotometry; the secondary object is to show that accurate and helpful central field studies can be made in a very few minutes as a part of office routine. The conclusions arrived at are based on over 1,000 satisfactory studies carried on, as a part of office routine, during the past five years.

The growth of this division of ophthalmological study can be divided into three periods.

In the first, up to 1875, is the recognition of physiological characteristics as shown by the delineation of the blind-spot and the relation of color and white fields. In this group are also included the grosser modifications of these characteristics by diseased conditions. In the next period, up to 1914, occurred the development of certain classical changes such as the Bjerrum and Seidel signs and Roenne's nasal step.

The third or present period, from the beginning of the World War, has presented refinements which have done more for the interpretation of our findings than has heretofore been possible; this refers particularly to quantitative perimetry. Our growth has not occurred in three epochal periods, for one has blended with another; there are numerous instances in which there has been a reversion to older views.

These three periods have not been the result of a successive series of discoveries, but are rather due to the accumulation of evidence from an increasing number of refined studies. These studies, while apparently dependent on certain peculiar types of technique, have developed from the methods used by the original investigators.

If we abstract the essentials, we find a less awful array of details for a satisfactory method of procedure than is generally realized. The basic essentials are but three.

1. Artificial illumination can now be set both as to intensity and quality. Seven to ten foot candles seem most useful.

2. Accurate fixation can be maintained with a short fixation distance, and a minimum accommodative effort.

3. Sufficiently small objects will not override the most minute scotoma.

When we apply these available facilities we have embraced the necessary prerequisites of accurate work. It has been impossible to attain this simplicity until the last few years, mainly because little acceptable evidence has been presented.

It is necessary now to discard such variables as color fields from clinical consideration. Objections to the clinical use of colored objects are numerous.

1. A high percentage of people suffer from congenital color-blindness, particularly for tints and shades of red and green.

2. Colors are too easily influenced by variations of pre-exposure and the surrounding field. The satisfactory duplication of conditions for subsequent visits is almost impossible.

3. Slight variations of light produce wide variations of color defects.

4. Retinal fatigue is said to be greater for colors.

5. We do not understand the mechanism of normal color perception and already there is much confusion on interpretation, such as the interlacing of color fields.

6. The only acceptably controlled studies on color fields tend to show that

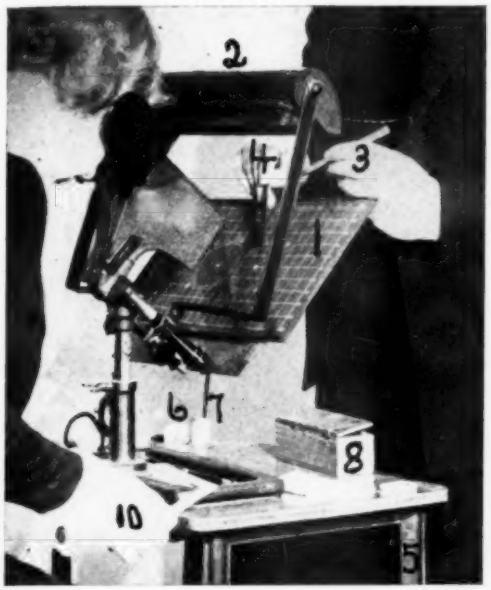

Fig. 1 (Evans). Showing the relations of patient, instrument and examiner in plotting central defects:

1. Lloyd slate or chart.
2. Lamp housing attached to the instrument.
3. Shows the magazine pencil held in the left hand out of the field.
4. The position of the hand moving the object. A white fixation point made with a piece of chalk is also visible. This seems to encourage steady fixation in certain subjects.

The stereocampimeter is mounted on a small typewriting table as indicated; having casters it is easily moved about. Attached to the examiner's side of the table is a cabinet, 5, in which charts, ready for use, are stored.

6, 7. Containers conveniently situated to hold the various sized objects. The minute objects are held by a rubber band to a tongue depressor for protection. Large objects, as provided for the stereocampimeter, are often used in cases of very much reduced vision. Lying on the table may also be seen a lens cloth and an eraser. On the table, within the stand base, a piece of chalk and other magazine pencils with various colored leads are seen.

It becomes apparent that the only preparation necessary to begin an examination is that of wheeling the table up into position for the patient. When the study has been completed, the map, 1, is slipped from the instrument and filed as the record; no recopying is necessary.

The little box marked 8 contains a number of colored and smoked-glass plano lenses to act as filters. They are to be dropped in the rim holding the lenses of the stereocampimeter, from the patient's side. The blank disc is also dropped in to block off one eye when the older model of the stereocampimeter is used. The patient may signal the disappearance of the little white ball by tapping, as indicated at 10, or by voice.

their clinical significance is impossible to interpret.

7. There have been no satisfactorily controlled studies on pathological color defects.

8. Normal color fields vary so much as to merge with the pathological[1].

9. Those who previously used colors most constantly, neurosurgeons, have discarded them.

10. Any defect which exists for colors exists also for small white objects as an absolute defect.

11. The technique for color fields is more difficult and complicated than for white fields.

12. It is necessary to use white objects whether colors are used or not.

13. The objections to colors are even more serious for central field defects than for peripheral field defects.

The whole aspect of color perimetry has been submerged by the productive studies of the quantitative method. It is also necessary to discard the superstition of a large tangent screen with its cumbersome proportions, its unnatural fixation distance, its tedious copying of pin points and its elaborate preparations. The black robe may be thrown aside and with it the clumsy head rest, the object wand, and the uneven screen surface with its spotty illumination.

If we consume more than five minutes in getting a normal blind-spot map, we can be sure that we are not taking advantage of the facilities which modern methods place at our disposal. In view of so radical a statement, radical to those who are loath to depart from the teachings of their fathers, it might be well to explain in detail the means employed to attain celerity.

The procedure about to be outlined has been in use continuously for the past five years. About two thousand studies have been made in that time; one thousand of these include vessel

shadow delineation, which demonstrates the reliability of the results.

The stereocampimeter, made possible by the work of Lloyd, first attracted my attention because it provided so many conveniences. It is mounted on a small typewriter table on castors, and when properly tilted is in a comfortable position for both patient and examiner. It is seldom necessary to use the binocular advantages which this device affords. A blinder from the trial case

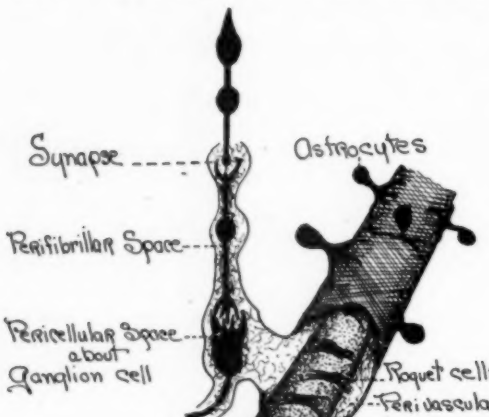

Fig. 2 (Evans). Diagram of the retinal perivascular lymph space.

may be dropped into one of the lens openings. The new model has a swinging section which makes unnecessary the use of an accessory obturator.

The instrument is provided with lenses, +5.25 D. sph., of such strength as to render the divergent pencils from the tangent surface or slate parallel on entering the subject's eye, so that it is not necessary for him to accommodate to see the fixation point clearly. With the patient's eye in position, the actual distance to the surface is 190 mm. but optically it is at infinity.

We have a tubular lamp mounted behind a daylight ground glass. Properly shielded, this is mounted to illuminate the campimeter surface and yet shade the eyes of both subject and examiner. This illuminator is attached directly to the stereocampimeter by metal arms. The lamp, made to order by a local fixture dealer, costs less than lamps provided by the manufacturers of the instrument, and though a soft glare from the surface cannot be avoided, no apparent detriment has resulted.

Since we resurrected direct recording methods* the manufacturers have provided black charts with a gray diagram; these are slipped into the grooves of the slate and, after the map is completed, are removed and filed directly as permanent records. The borders of the defects are marked with a colored pencil. A number of metallic magazine pencils are provided for this. The colored leads (the light colors are the more useful) are made of some composition which can be erased with the ordinary rubber eraser.

Should one wish to avoid the expense of a stereocampimeter a Peter hand campimeter may be used. We prefer the former device because it is mounted steadily on a table. It is necessary to modify this hand instrument to meet the requirements outlined above.

The distance between the chart and the cheek rest should be altered to 190 mm. A large toric lens of +5.25 D. strength is mounted on the cheek rest in such a way as to stand before the examined eye. It should have a deep base curve and be corrected for oblique rays. The so-called orthogon spectacle lens is satisfactory because it can be cut to a diameter of 48 mm. It should be mounted in a dull black bakelite rim 6 mm. wide.

The black charts as supplied for the stereocampimeter may now be clipped upon the hand campimeter surface in such a way as to bring the center of one hexagonal figure before the eye to be examined. The subject must have the opposite eye covered in such a way as to avoid pressure on it. Pressure on the occluded eye may cause changes in the scotoma of the eye under examination.

The illumination for this device must be of a sort less satisfactory than that described for the stereocampimeter. A filtered beam, through daylight blue glass, from a device such as the Ham-

*The first to use this method was evidently Solberg Wells, a pupil and disciple of Graefe.

mer-lamp is most nearly satisfactory, but the distance of the source from the chart and the angle of incidence should be noted. It is necessary to duplicate the conditions at subsequent examinations.

The final feature to be elucidated is that of the object used. We have had repeated warnings by writers of the last forty years to use small objects but we have been content to use whatever the manufacturers sent us. Small field defects have been continually missed because the objects were so large that they could not be completely hidden in the defect.

It has been repeatedly pointed out that it is not enough to select an object of this or that angular size[2]; we must use objects just at the limit of our best vision if we are to pick up defects which cause but slight reduction of acuity. An object completely hidden by a defect outlines an absolute scotoma, one incompletely hidden gives a relative scotoma of much larger dimensions.

Every relative defect is a positive defect if a sufficiently small object is used. By using a small object, we remove the qualitative guess of the patient from the study, and replace it by his direct statement of seeing or not seeing, a quantitative measure of the defect.

While standard vision is 6/6 (20/20), nearly everyone can read 6/4 (20/13) in the absence of disease or anomaly. Vision below 6/4, or 6/6 if you prefer, and not caused by opacities of the media or refractive error, indicates the presence of a scotoma. Since the recognition of a 6/6 letter necessitates an ability to distinguish a separability of one minute, the width of an arm of a 6/6 letter, we should use an object of one minute size to delineate a defect which reduces the acuity slightly below this.

Fortunately, a larger object than this accomplishes the end. One of even five minutes diameter, one-quarter millimeter for the campimeter slate, will in most instances outline a central scotoma which reduces acuity to 6/9 (20/30). We routinely map those subjects whose vision does not correct to 6/4, providing the reduction has not been satisfac-

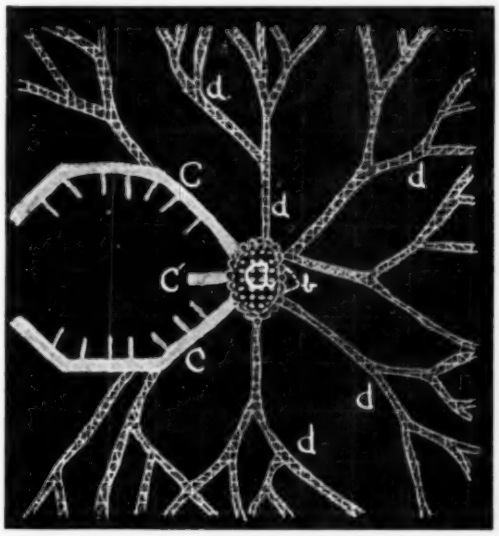

Fig. 3 (Evans). Diagram of three types of angioscotoma distribution. Perhaps the most important point in the procedure is the necessity to move the object at right angles to the border of the defect. It therefore becomes essential that one be familiar with the general character and location of the normal angioscotoma.

The above diagram represents the three types of distribution of the retinal vessels: a. the blind-spot; b. the zone of hook-like fingers arising from the vascular circle of Zinn; c. the branches that arch above and below the macula with their spoke-like arrangement, and the horizontal stem that extends from the blind-spot at ć. d represents the radiating system of double branching from the blind-spot which results in the formation of wedge-shaped areas of the subdivisions.

Individual branches may become widened in pathological conditions, or the finer branches forming the ultimate wedge-shaped systems may become so widened as to merge with adjacent wedge-shaped systems so that the final and characteristic defect, particularly at the periphery, is a wedge-shaped scotoma with its base out and its apex toward the blind-spot and attached to it by means of an angioscotoma.

When a pathological change has affected the macula, ć widens and extends longitudinally so that it becomes connected to the central scotoma. The same may be true of all or a number of the spoke-like shadows from big C. It is thus possible to find a central scotoma by tracing ć or the small spokes toward the fixation point. The object is always moved from seeing to blind area.

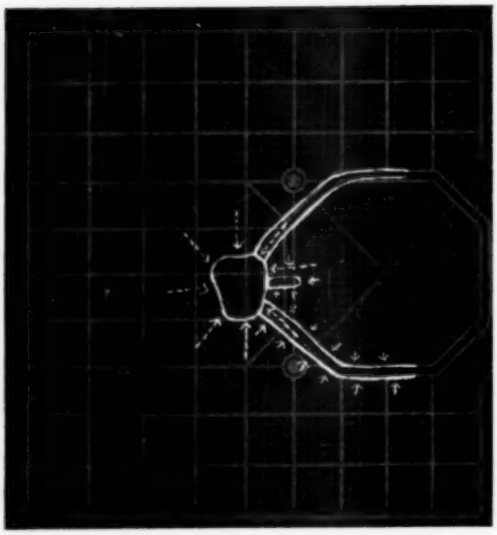

Fig. 4 (Evans). Routine area studied and method of mapping. The above chart indicates the method of mapping a classical angioscotoma and blind spot. The object is moved rather slowly, counting one, two, while crossing the small square, always at right angles to the supposed border of the defect; the general arrangement and position of the normal angioscotoma is constantly visualized by the examiner.

The blind-spot is mapped as indicated from eight directions. The points intermediate between the vertical and horizontal movements allow approach to the blind-spot obliquely, and usually follow the course of the vessel shadow; in so doing, the objects are not obscured as would be the case were they to approach more nearly at right angles to the vessel shadow border.

The vessel shadows are mapped by seeking alternate points on opposite sides as indicated by the small arrows. When once the technique has been mastered it is not necessary to map so many points. Adjacent to the blind-spot one often finds that the vessel shadow is more obscure, perhaps due to the overlying nerve fiber bundles, than it is three or four degrees away.

If a minute object seems to be too vague for the subject to report on, a slightly larger one may be used. If there is any difficulty in finding the angioscotoma, a smaller object should be used. It is necessary that the same size object be used each time during a series of studies; but occasionally a radical change in a patient's condition may demand a larger or a smaller object.

A red glass, or other color, placed before the patient's eye dims the whole field as well as the object, and makes more sensitive a larger object. This provides a constant and reproducible means of variation. It is better to use a smaller object so that the data are all in the same terms and thus more easily interpreted.

torily accounted for by evidences of disease.

The size of the object will vary with different individuals, for visual acuity is dependent on many factors other than the size of the retinal image. The most universally satisfactory object is 0.5 mm. The size of the object may be physiologically reduced by placing a colored glass of any color before the patient's eye to reduce the illumination over the whole retina.

How is it possible to construct and employ such minute objects as one-quarter millimeter and thereabouts? Very fine pure silver wire, one-eighth millimeter or less in diameter, may be procured from a jeweler. Or one may buy the G or C string of a cello; this is made of gut overspun with silver wire. Copper wire silver plated will not prove satisfactory.

The wire is to be unwound from the gut; a length about five inches long is straightened out and its end thrust into a Bunsen burner flame. A minute sphere is soon formed on the end. A little practice will enable one to vary the size of the sphere. When the sphere is dipped into hydrochloric acid it will become pearly white, the white chloride of silver, if the silver is pure. It is necessary to redip them in acid once a week as the atmosphere turns them yellowish.

The stem is blackened with India ink, which withstands the action of the acid, and then mounted with glue between two sheets of black chart paper, such as that used on the instrument. The size of the sphere can be accurately measured with a micrometer gauge.

Our work on the perimeter has been deformed beyond recognition by the mechanical limitations of the instrument. We follow some geometric design as set by the chart or automatic features of recording devices. We apply the same scheme to our tangent surfaces. Radiating lines, concentric circles or spirals have been the prescribed routes over which we have moved the objects. Occasionally a voice has been raised in protest.

Let me strongly emphasize the need to approach the suspected blind area at

right angles to its borders, using the physiological scotoma as the basis from which to seek variations.

Technique of instrumentation in any branch of medicine is not enough to guarantee usable results; one must base such examinations on a sound understanding of the anatomy and physiology of the parts concerned if the interpretation of the maps is to be accurate.

With a few reservations we may say from the available evidence that fiber bundle considerations belong to the peripheral field studies or to quantitative perimetry, and retinal vessel distribution to the central field.

From our freshman days in college we have been constantly impressed with the need to study the normal so that we might recognize deviations from its set standards as meaning the pathological. Structures such as nose, cheek, brow and retinal extent determine the limits of the normal peripheral field. We know that departure from the characteristic shape means the pathological.

We have had numerous elaborate studies setting the characteristics of the normal blind-spot so that we may be in a position to recognize variations of size and shape as pathological.

As far as the retina itself is concerned, our knowledge of the distribution of fiber bundles has expanded but slightly in the past twenty-five years. Despite recent praiseworthy efforts of careful investigators, we can state little more than that the fibers radiate in all directions from the nerve entrance except towards the macula, about which they arch and form a sharp line at the horizontal raphe. This line they do not cross and it extends to the periphery.

We can perhaps say that we must accept the Leber-Fuchs idea of the arrangement of fibers adjacent to the disc; those fibers emerging from the periphery of the nerve supply retina nearest to the nervehead; those from the center of the nerve pass to the most peripheral retina. Despite many opinions, we do not have conclusive evidence as to the area of the retina covered by the papillomacular bundle, but only that these fibers pass more or less horizontally to the macular region from the nervehead.

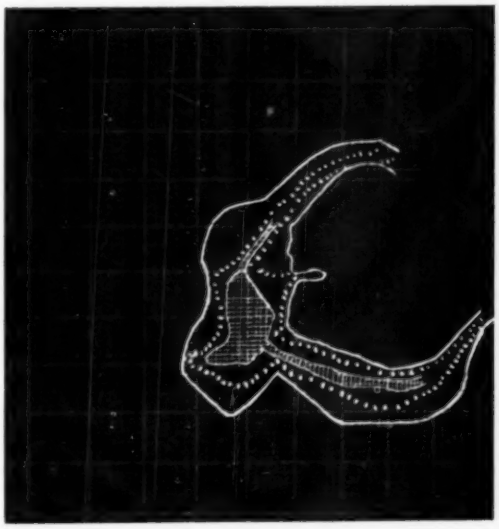

Fig. 5 (Evans). The above chart shows the relation of scotoma, tension and vision is a well established case of glaucoma. The continuous line shows the plotting as first recorded with vision of 3/15 uncorrected and tension 40 mm. (McLean). Then one drop of 0.5 percent eserine was instilled. Thirty minutes later the plotting was repeated as indicated by the dotted line. The vision and tension remained unaffected. Sixty minutes later the defect had diminished as indicated within the cross-hatched area, and the vision had improved to 3/10 plus 3, with tension of 30 mm. The maps were all made within one hour and demonstrate that medication may probably keep under control the progress of the disease. Such a map is a very satisfactory means of demonstrating the state of affairs to the patient. A large series of these studies has been made. The clinical value of the methods suggested has been uniformly satisfactory.

All things considered, these known facts about fibers help us little if any, because we do not know their ultimate relations to the rods and cones in a topographical sense. Using the angioscotoma as a norm from which to study variations, we have an extremely sensitive basis from which to detect pathological evidence in its earliest manifestations.

The movement of the object at right angles to the shadow implies an un-

derstanding of the physiological, as all known pathological defects can be accounted for as being departures from the existing normal defects. We must keep in mind the vascular and perivascular retinal systems if we are to master the technique and interpret the results of central field defects.

This must consider the area twenty-five degrees in each direction about the fixation point in order to include those normal scotomata, variations of which are interpreted as pathological evidence. The blind-spot of Mariotte corresponds to the optic nervehead and the angioscotoma is associated with the retinal vascular and perivascular systems.

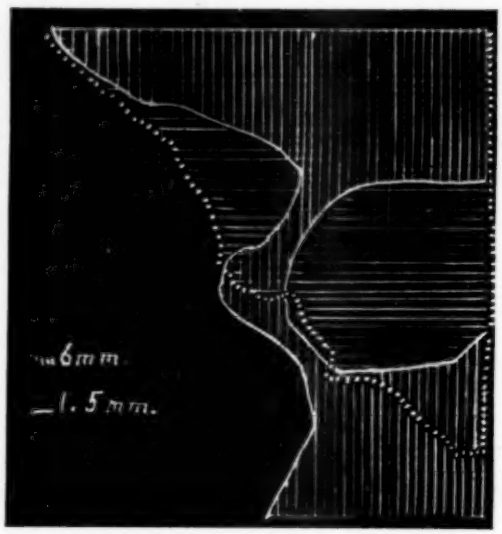

Fig. 6 (Evans). The area within the dotted line corresponds to a detachment of the retina. The area within the continuous line, horizontal markings, represents the improvement after the patient had been kept quiet in bed. It will be noted that the second plotting was made with a much smaller object. Had it been made with the 6 mm. object, the improvement would have been apparently much better. The patient was, of course, greatly encouraged by this graphic demonstration of improvement. Numerous studies on cases of detached retina have been made. Detachments are often plottable before they are visible by the ophthalmoscope. It was necessary to use the opposite eye for fixation in making the above study.

Our first considerations begin by recalling the three types of arrangement of the retinal vessel system.

Type 1. The retinal vessels divide dichotomously. This results in a radiating arrangement of wedge-shaped units, each with its apex towards the nervehead.

Type 2. Arching temporally above and below the macula are moderately large vessels which send finger-like branches pointing towards the macula. The arterial branches form loops with venous branches about the macula.

Type 3. It will be recalled that the long posterior ciliary arteries form, by some of their branches, the vascular plexus of Zinn behind the lamina cribrosa. Little hook-like projections pass from this forward about the nerve-edge into the retina where they end. Two of these little arteries run horizontally from the nervehead towards the macula. It is probable that cilio-retinal vessels are these but enlarged.

The perivascular lymph space system of the retina must be considered next. It is composed of three links.

The first link is the pericellular space. We have evidence that this surrounds each ganglion and bipolar cell, follows up the fiber of the bipolar cell and includes the synapse of the fiber from the rod and cone layer, and follows the descending fiber to include the inner synapse between the fiber of the bipolar cell with the ganglion cell. This same space follows the fibers of the ganglion cells as such fibers are formed into bundles.

The second link may be considered as the perineural space about the fiber bundles. Some of these spaces follow the fiber bundles out through the nervehead, but many empty into the perivascular space.

The third, or perivascular link, follows the retinal vessels out through the optic nerve and may empty into the vaginal space as the vessels leave the nerve, but more likely it empties into the orbital lymph spaces.

We must recall certain histological features at this point.

First, the perivascular spaces are probably capable of contraction and dilatation through action of the sucker-feet of the astrocytes which make up the outer wall of the space.

Second, the retinal vessels are probably supplied with Rouget cells whose encircling bodies can produce marked variations of vessel caliber.

Third, the perivascular lymph system probably represents the posterior drainage system for the aqueous elements of the vitreous; obstructed outflow means back pressure about the synapse with interrupted conductivity of the nerve impulse and suspended function of the related rods and cones.

Keeping the anatomical and associated physiological conditions in mind, we move the minute test object at right angles to the known anatomical defects which are caused by the entrance of the nerve and the retinal vascular-perivascular system. We are thus able to outline the blind spot of Mariotte and the angioscotoma.

Any change, physiological or pathological, which would decrease the size of the perivascular space would also increase the pressure in that space and cause edema at the synapses with the resulting depression of rod and cone function. This we detect by a widened angioscotoma. In the interpretation of such a defect we must consider all those influences which may raise the perivascular space pressure. Theoretically these influences have three places of origin.

1. Originating in the vessel:
   a. Dilatation:
      1. local; by relaxation, due to the Rouget cell or the muscularis in the larger arteries.
      2. generalized; physiological and pathological; venous stasis.
      3. systemic; indirect influence of great venous plexuses.
   b. Thickening of the vessel wall, mostly the outer layers.
      1. localized; plaques and so on.
      2. generalized.
   c. Variations in the permeability of the vessel wall. This is important in view of our newer conceptions on the pathogenesis of glaucoma.
2. Originating in the perivascular spaces:
   a. Constriction; by relaxation of the astrocyte fibers and resulting from imbibition from the blood stream or tissue fluids and vitreous.
3. Originating from adjacent tissues:
   a. From the vitreous, due to an excess of the aqueous element caused by
      1. altered hydrogen ion content of the vitreous or
      2. diminished aqueous drainage at angle.
   b. Products of inflammation escaping through the spaces and obstructing them; uveitis, retinitis, vitreous débris.

It is unprofitable to attempt to outline the whole scotoma which corresponds to the entire retinal vessel tree. Such a study, while possible to a remarkable degree, has only been done in the past as a necessary preliminary to the elaboration of a practical procedure.

It is seldom necessary or desirable to do more than map a few vessel stumps for a short distance from the nervehead.

In suspected glaucoma we may map an angioscotoma that emerges from the upper end of the blind-spot and arches above the fixation point. A corresponding one is mapped below along with a small stump that emerges along the longitudinal meridian and points towards the fixation point. This last is particularly important in cases in which central vision is affected early.

Since normal eyes show these scotomata, the widening with the onset of glaucoma will gradually result in the Seidel sign and then in the Bjerrum sign; finally Roenne's nasal step will be disclosed unless the upper and lower members are equally widened, when the ring scotoma will evolve. It is probable that even the classical nasal defect at the periphery is but a continuation of the widened angioscotoma in its peripheral division.

Widening of the scotoma may be present only in the morning when tension is highest. It sometimes lasts an hour or so after tension has been lowered, particularly if the case is of long

standing and more or less permanent damage has been done. It is always evident when pressure is above normal and many times is present before the tonometer can record the increase. Transient widenings may even be present a number of years before the tonometer gives evidence.

The repeated maps should as far as possible be made at the same time of day, just as repeated tension should be, so that we may strike the pressure curve at the same point of rise or fall. By making a map, instilling pilocarpine or eserine and remapping, we can, if necessary, tell at a single visit what we may expect of medication. Certain studies apparently indicate that glaucoma can be detected by a study of the angioscotoma as much as 3 years before other definite evidence appears.

Retinal detachment, retinal edema and early choroiditis have been detected before they were visible with the ophthalmoscope, by following towards the periphery a widened angioscotoma which was discovered near the blind spot. A point-like bulge of the blind-spot should indicate further investigation of the angioscotoma emerging from that region, as it may be followed to the site of the lesion. Such a map follows accurately the progress of the disturbance.

In interpretation of defects arising from variations of the angioscotoma, we must remember that these shadows are so sensitive that they will record changes incident to such minor disturbances as a coughing spell, a tight collar, a careless rub of the eye and so forth. The examiner will soon learn to avoid misinterpretation of these and he will not expose the subject to a strong light, as the ophthalmoscope or slit-lamp, just before plotting.

A list of the conditions in which angioscotometry has been most helpful includes glaucoma, focal choroiditis, the various forms of retinitis, retrobulbar neuritis, vascular accident of the retina and increased intracranial pressure. Among the degenerative processes the angioscotoma of retinitis pigmentosa offers a means of study which in view of numerous new forms of treatment has a particular significance.

Keeping in mind the above factors of technique and anatomy and physiology, the mapping of central field defects is rapid and practical. Refined changes of utmost clinical significance will soon become so apparent as to make indispensable the ten or twelve minutes spent on the examination. The adoption of the suggested procedure makes for better ophthalmology.

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THE VALUE OF QUADRANT FIELD DEFECTS IN THE LOCALIZATION OF TEMPORAL LOBE TUMORS

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A brief discussion of visual changes in temporal lobe tumors is given. The quadrant field defects are the most important localizing signs. Report of a case having this field defect, with papilledema and paralysis of divergence is given. Read before the Brooklyn Ophthalmological Society, April 24, 1930.

There are relatively few neurological lesions in which the ophthalmologist has the opportunity of playing the major rôle in diagnosis, and much less so in their localization. This is somewhat surprising, in view of the large areas of brain space devoted to the visual pathways. The optic nerves enter the cranial cavities in the sphenoidal region of the brain, and are then continued backward through its various connections to the calcarine areas of the occipital lobes. Such a large area can readily be involved in many brain lesions, and it is precisely in temporal lobe lesions, where there is such a paucity of other localizing signs, that the ophthalmologist plays the dominant rôle.

It is interesting to note that as far back as 1881, Hermann Willbrand[1] reported several cases of aphasia with hemianopsia in left sided lesions of the parietal, temporal, and midbrain areas. Aphasia was not present in right sided lesions. He also made the observation that many failures to bring out the visual defects were due to the use of too large test objects.

It is to Cushing and his co-workers, especially Walker, that we in this country, owe most of our knowledge regarding the field defects in the various brain lesions. In 1911, Cushing[2] said that "No symptoms produced by intracranial growths are as important as the visual disturbances. Deviations from the normal may be the only means of localization. The earliest stages may show only color defects."

In 1925, Foster Kennedy[3] stated that "tumors of the temporal lobe, especially of the right side, are the most difficult of all brain growths to recognize, because of the comparative latency of the region involved." He was one of the early observers to recognize the so called "uncinate fit" in temporal lobe tumors, consisting of a subjective sensation of a foul odor, with reflex spitting and champing movements of the mouth and lips, nausea and vomiting, accompanied by a queer feeling and subjective visual sensations. He describes the visual sensations as of a constructive and co-ordinative character not present in the crude scintillations from irritation of the calcarine cortex, as in scintillating scotoma. From pressure in the region of the midbrain there may also be fixed pupils, limitations of conjugate movement and transient Argyll Robertson pupils.

Benedict[4] states that the loss of visual acuity is not an early sign of temporal lobe tumors, and stresses the importance of testing the eyes functionally. In his series, at the Mayo clinic, 52 out of 60 cases showed field changes. Seventeen of them were definitely localizable by the field defects, while the neurological findings were general. Definite localization was possible in 43 of the 60 cases from the field changes alone, while only 40 of the 60 cases could be definitely localized by the neurological findings.

In 59 cases of temporal lobe tumors, Cushing[5] reported 39 cases with changes in the fields, 25% showed partial hemianopsia. Less than 19% of the combined series had visual hallucinations.

Casamajor[6] calls attention to the fact that taste and smell have bilateral centers in the tips of the temporal-sphenoidal lobes, irritation of which causes hallucinatory outbursts of smell and taste, usually of an unpleasant nature. Convulsive attacks are also common.

The following case is reported and demonstrates clearly, many of the points mentioned.

I. S., a male aged 26 years, a reporter by occupation, was first seen by me on October 11, 1929, complaining that he was seeing double. For the past year, he had been having occasional attacks of unconsciousness. These attacks lasted for a few seconds and were accompanied either by visual or auditory auras. The auditory auras consisted of beautiful angelic voices, while the visual auras were made up of angles or corners of rooms, never of persons. These auras were always the same. He never had hallucinations of smell or taste, nor did he ever have convulsions. About one year ago, at the commencement of his complaint, the patient had profuse rhinorrhea and a severe headache and vomiting. The condition was diagnosed as petit mal on several occasions.

On September 13, 1929, while on his way back from Europe, he saw double for the first time. This diplopia has persisted ever since. In October 1929, he again had a profuse rhinorrhea and a headache but no vomiting. The attack lasted about ten minutes and was accompanied by blurred vision.

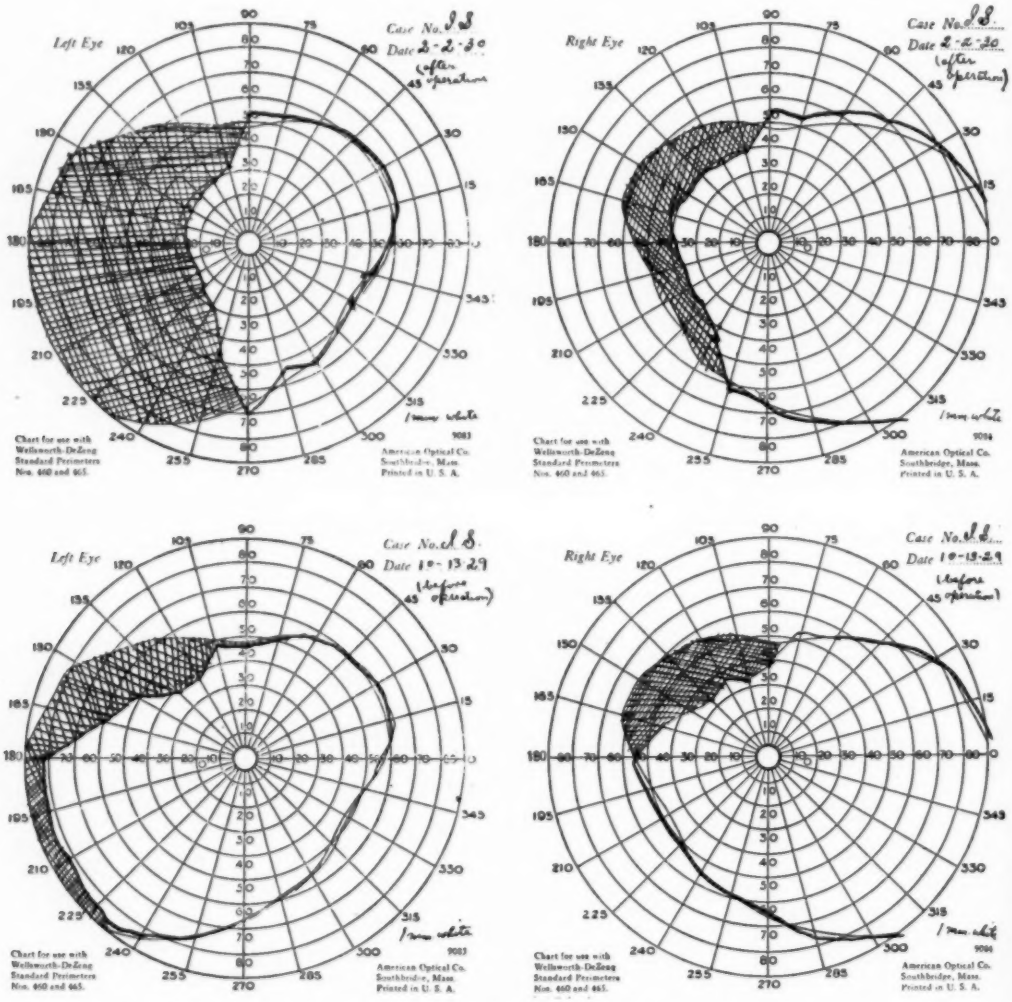

Fig. 1 (Kravitz). Charts showing field changes after and before operation.

The physical examination except for the eye findings was negative. Vision: O.U. 20/15. There was no limitation of movement of either eye and no nystagmus. There was a slight, barely perceptible convergence of his eyes in looking at a distance. The pupils were equal, regular and reacted to light and accommodation. Fundus examination revealed a bilateral papilledema of about one and one-half diopters, right and two and one-half diopters, left. Examination with the red glass revealed an homonymous diplopia not increasing up, down, right or left, but only increasing for distance. At read-

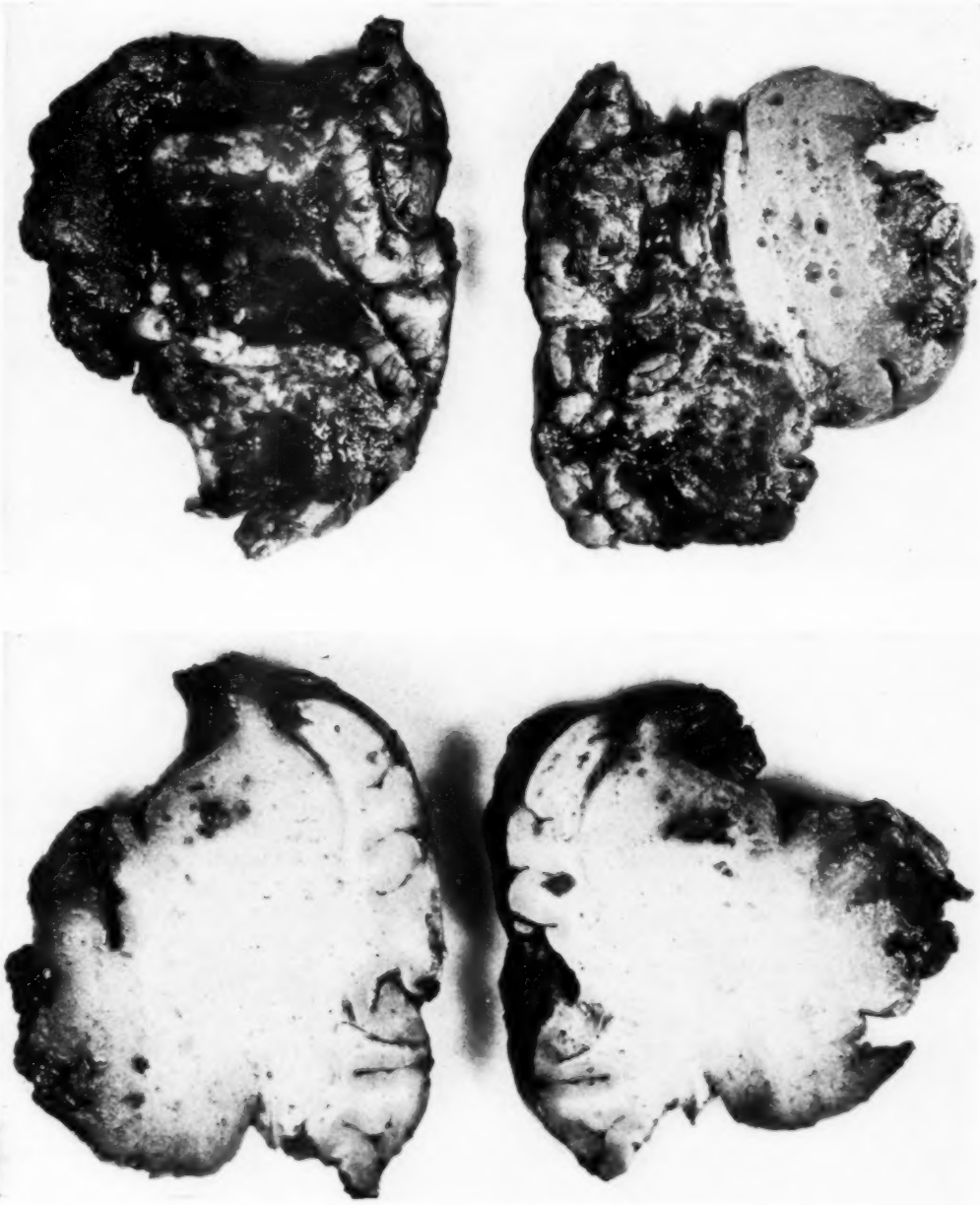

Fig. 2 (Kravitz). Excised brain tissue showing tumor. Courtesy Dr. Dandy.

ing distance there was no diplopia and he was able to fuse pictures on the stereoscope.

Perimetry revealed an upper left quadrant homonymous hemianopsia. Inasmuch as the defects were outside of 35 degrees from the center, the defect did not show on the tangent screen. A diagnosis of right sided temporal lobe tumor was made and the patient was referred to Dr. A. M. Rabiner for neurological study, but no other signs of localizing value were elicited. The patient was then referred to Dr. Dandy, after a period of observation at the Mt. Sinai Hospital, in New York City.

On November 5, 1929, Dr. Dandy removed a large deep-seated glioma and with it practically the entire right temporal lobe of the brain. Dr. Dandy afterward stated that the only localizing signs of value were the field defects.

The patient was again seen on February 2, 1930; vision, O.U. 20/15. The papilledema had entirely disappeared as had likewise the diplopia. In fact the first thing noted by the patient on regaining consciousness was the absence of diplopia. Following the operation he developed marked hypertonia of the left side associated with convulsive attacks of the Jacksonian type on the same side. These continued for a long time, but at present have greatly diminished in their intensity and frequency. The visual fields were interesting in that the left eye showed a marked increase in the field defect, while the right eye showed but a slight increase.

In 1907, Adolph Meyer[7] described the ventral fibers of the optic radiation as going forward from the geniculate body, winding around the tip of the lateral ventricle and then continuing backward to the calcarine cortex. Traquair[21] does not accept this view. He says that if the upper field defects, in temporal lobe tumors were due to involvement of Meyers loop, then there should occur congruous field defects of the type seen in involvement of the optic radiations further back, but practically all of the charts studied in temporal lobe tumors were of the incongruous type. Traquair therefore believes that temporal lobe tumors involve the optic tracts anterior to the geniculate ganglia, before the corresponding retinal points have come into juxtaposition. In the case reported, the incongruity increased enormously following the operative trauma, and would tend to bear out Traquair's contention. It is also of interest to note that the greatest field defect was on the side opposite the lesion.

Paralysis of divergence has been a rare symptom in brain lesions, and this is the first time to the writers knowledge that it has been noted in a case of temporal lobe tumor.

Willbrand and Saenger[8] reported 15 cases of divergence paralysis and state that in normal eyes, active divergence can occur only after relaxation of active convergence.

M. A. Glaser[9] states that paralysis of divergence may result from pressure in the region of the mid-brain, as from pineal tumors.

Duane,[10] in reporting a case, thinks that there is a divergence center near the sixth nerve nucleus. Peter[14] is also of a similar opinion.

Straub[11] reports three cases and states that the abducens nerves send fibers to each other to form a center in apposition to the convergence center.

The comparative rareness of divergence paralysis may be explained philogenetically. It is believed that the structures of the brain most recently developed are the least resistant to involvement, while the older structures are more resistant. Tilney[12] aptly says, "The deeper lying cellular elements are mechanically fixed and least variable elements in the composition of the axial gray matter, while the superficial nuclear aggregations represent the recently acquired more plastic structures of the stem."

Tilney[13] has conclusively shown how single binocular and stereoscopic vision as shown by the development of the oculomotor nuclei, and the nucleus of Perla, have developed in the higher anthropoids and reached its highest state in the brain of man. Is it not therefore probable, that, in the remote

past before these functions had begun to develop, the lateral movements of the eye, which increased the lateral horizon, were of greater importance. The divergence nucleus would represent one of the older brain centers. Because of its diminished importance it would also probably be smaller than in the past. For these reasons, the centers for divergence would be more resistant to insult than the convergence centers, and therefore more rarely involved.

The rhinorrhea is more difficult to explain, neither Dr. Dandy nor Dr. Rabiner could offer an adequate explanation for its occurrence.

I wish to express my appreciation to Dr. Dandy for his kindness in furnishing the photographs and most detailed reports of his operative findings.

201 Eastern Parkway.

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PULSATING EXOPHTHALMOS

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Two cases are reported in detail and the results of sixty-three other cases which were described by physicians in reply to a questionnaire are given. A review of the literature is given. Read before the Cleveland Ophthalmological Club, October 14, 1930.

The clinical entity known as pulsating exophthalmos is one of comparative rarity yet when a case appears in the practice of any individual, it is of such severity and gravity that it demands immediate attention and decision as to procedure. No single individual can see sufficient cases during his life of practice to be able to evaluate the results and be ready to advise as to treatment or prognosis.

Pulsating exophthalmos is a condition characterized by marked proptosis of one or both eyeballs, with subsequent loss of mobility in one or more directions, especially outward, with marked swelling of the eyelids and chemosis of the conjunctiva. There is usually either visible or palpable a pulsation over the eyeball and upon auscultation a loud swishing bruit is heard which is synchronous with the radial pulse, and which is loudest during the period of systole in certain types of cases, namely those in which there is rupture of the internal carotid artery. Very often the cornea becomes affected from lack of proper lid protection, the arteries and especially the veins of the retina are overfull and tortuous and optic neuritis supervenes. Later there appear retinal hemorrhage, cloudiness of vitreous, and optic atrophy, with considerable or complete loss of vision. If untreated, there may result thrombosis of the cavernous sinus, rupture of the sinus and other intracranial complications.

The causes of pulsating exophthalmos may be listed as: 1. arterio-venous aneurysm between internal carotid artery and cavernous sinus; 2. aneurysm of ophthalmic artery; 3. vascular tumors of the orbit or surrounding structures; but in most cases it is due to—4. traumatic rupture of the internal carotid in it's passage through the cavernous sinus.

In many of the reported cases there seems to be a general arterio-sclerosis present which predisposes to vessel injury, in many others there is a fracture of the skull, but in many cases no other evidence of the trauma can be found except the pulsating exophthalmos. Following the rupture of the artery there is a rush of arterial blood into the sinus with consequent "backing up" throughout the venous tree which empties into it, and especially into the ophthalmic vein and its tributaries because the soft tissues of the orbit and lids yield readily to distention. Through these venous channels the arterial pulsation is transmitted to the eyeball and surrounding structures.

The first clinical description of this condition was given by Travers in 1809 and the first anatomic examination was made by Barron in 1835. Since that time many cases have been reported in the literature and a number of reviews of the literature have been printed which bring the subject fairly well up to date.

In 1923 Locke, in an admirable and very complete paper reported 588 cases which had appeared in the literature up to June of that year. Of these cases, 23 per cent were spontaneous and 77 percent were traumatic, practically all of the latter being shown to be due to a rupture of the internal carotid artery within the cavernous sinus. In the spontaneous cases 25 per cent were due to intra-orbital tumor, 25 per cent to simple aneurysm and 50 per cent to arteriosclerosis. In June 1927 Jennings reported a new case treated by slow ligation of the common carotid with Neff's clamp and in addition states that he found seven additional cases after

Locke's paper and before his own, but gives no details of them. His own case is classified as improved but not cured.

I have been able to find altogether 20 cases, including my two, since Jenning's paper was published, seven of which are in foreign language journals to which I have not had access. The remaining 13 may be classified as follows:

Slow or clamp ligation common carotid:		4
Cured	3	
Improved		
Died following hemiplegia	1	
Complete ligation common carotid:		2
Cured (hemiplegia with recovery)	1	
Died following hemiplegia	1	
Ligation of internal carotid		4
Cured	3	
Died (following hemiplegia)	1	
Untreated:		3
Apparently recovered	1	
Not reported	1	
Growing gradually worse	1	
		13

These 13 cases show a very high incidence of hemiplegia and death with three cases, or 23 per cent. In addition, there was one case of hemiplegia with recovery, making a total of four or 30 per cent. The total deaths also equal three or 23 per cent, much higher than the general average.

There have now been reported in all, 616 cases including the 588 cited by Locke, 8 by Jennings, and the 20 collected in this report of which the end results are given in thirteen, including the two of my own, the reports of which follow.

Case 1. K. H., white, male, aged 24 years, in good health, but of very intemperate habit, was first seen on June 22, 1929, when he complained of bulging of the left eye with noise in the head. He said that on May 30th he "got some bad liquor" and "passed out" apparently falling to the floor, and wrenching himself severely.

There was visible an exophthalmos of the left eye of 8-10 mm. with marked chemosis and swelling of the conjunctiva. The cornea was clear, pupil regular and equal. There was pronounced pulsation over the eyebrow and when a stethoscope was applied to the closed lids or to the bones of the skull a loud bruit could be heard synchronous with the heart beat.

The media were clear. There was marked tortuosity and distention of all the left retinal veins, together with pulsation.

Fig. 1 (King). Case one at time of first examination.

Compression of the left common carotid stopped the pulsation and the bruit, reduced the size of the retinal veins, and relieved the feeling of pressure around the eye but resulted in a tingling sensation in right arm and leg.

There was diplopia on looking downward and also outward, but in no other direction. The vision in each eye was only 20/100, apparently due to a high astigmatism of about + 4. cyl. ax. 90° as measured with the retinoscope.

On June 25, 1929, the patient was put in the hospital and compression of the left common carotid carried out for 20 minutes every two hours. This was continued until July 1st without improvement or without any transient paralysis of the right side, even the tingling was no longer present during

compression. The blood and spinal fluid Wassermanns were negative.

On July 1st under local anaesthesia a general surgeon, Dr. B. C. Barnard, ligated the internal carotid artery. The patient stood the operation nicely and there was an immediate cessation of bruît, both subjectively and objectively, and the patient felt much better.

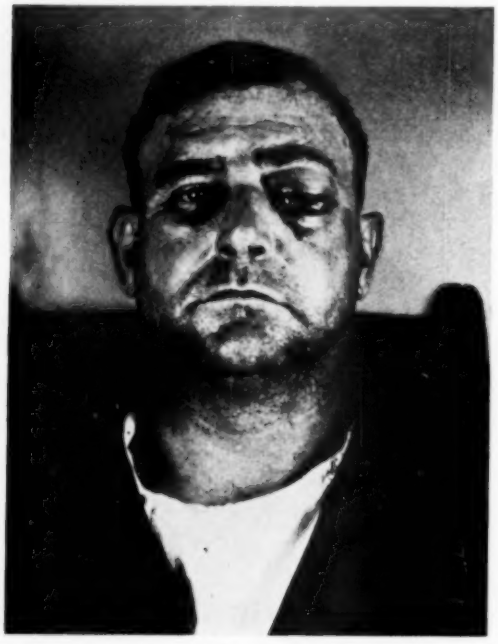

Fig. 2 (King). Case two about four weeks after onset.

About 10 o'clock the night of the operation the patient suddenly became irrational and got out of bed, immediately falling to the floor. When the nurse put him back into bed she noticed that the right arm and leg did not move. Examination next morning revealed a complete paralysis of the right arm and leg, the right side of the face, and complete motor aphasia. The mentality seemed good.

The patient continued about the same until July 8, 1929, when he became unconscious, developed a rapidly mounting temperature, pulse and respiration, and died at 1:30 p.m.

An autopsy revealed a rupture of the internal carotid artery in the cavernous sinus, marked softening and degeneration of the left cerebral hemisphere.

Case 2. J. W., healthy, white, male, aged 44 years, was first seen June 26, 1930, when he came to our office complaining of irritation and poor vision in the left eye. He reported that there was difficulty in seeing when he looked to the left, and that he then saw two objects. He had been in the habit recently of covering this eye when driving his truck because of the confusion which the diplopia caused him. Vision, O.D. = 20/25; O.S. = 20/20.

He made no voluntary comment about head noises and as there was no exophthalmos present no questions were asked. There was a definite weakness of the external rectus muscle, which should perhaps, have made us suspicious. A blood Wassermann was negative.

The patient reported that several weeks before he had been cut on the head with a knife and had been in Mt. Sinai Hospital, Cleveland, where x-rays of the skull were taken. He was discharged in a few days. About two weeks after this he received a rather severe blow on the head while entering a cellar. The history is rather vague as to whether he had subjective noises while in Mt. Sinai, but it is very definite, on inquiry, that they have been present since the latter injury.

On July 7th the patient was again seen. This time there was considerable injection of the bulbar conjunctiva and marked chemosis of the conjunctiva in the lower cul-de-sac. There was a very definite exophthalmos present and fundus examination showed dilatation of the veins. This had not been true previously. It now occurred to us that here might be another case of pulsating exophthalmos, but upon palpation, no pulsation could be felt. With the stethoscope, however, a very definite bruît could be heard over the eye and over the bones of the skull surrounding the orbit. A definite diagnosis was made of traumatic arterio-venous aneurysm without pulsation. As this man was without funds for hospitalization and a resident of Cleveland, he was referred to Dr. Paul Moore at Cleveland City Hospital with whose permission I report the case.

Soon after admission the cornea became dry and opaque and the fundus could not be seen. The patient complained rather bitterly of headache during the early part of his hospitalization but this gradually diminished until he was free from bruit and remained so for several days, only to have it return. Some time later the bruit again ceased spontaneously, the chemosis and exophthalmos gradually subsided, and the eye returned to the condition in which it is at present.

I saw this patient two weeks after his discharge from the hospital and found the condition of the eye was as follows: The lids were free from swelling and the conjunctiva practically normal except for a redundant fold in the lower cul-de-sac, where chemosis had been the greatest, as shown by the illustration. Movement of the eyeball was still limited in the field of action of the external rectus muscle. Pupil reacted sluggishly to light, vitreous contained numerous floating opacities, through which the fundus could be only dimly seen. There was a definite neuritis of the optic nerve. Vision was fingers at 18 inches. There was not more than 1 mm. of exophthalmos and the patient was free from subjective symptoms.

The disastrous experience with my first case led me to speculate as to the frequency of hemiplegia of which very little or nothing was said in the text books, or in the compiled statistics of various authors. Hoping for more definite information, I searched the literature since 1916 and sent questionnaires to all the authors in the United States and Canada who had reported cases, and in addition to professors of ophthalmology in all of the medical schools. To these questionnaires, I received replies reporting a total of 63 cases. How many of these are previously reported cases, I cannot say, but certainly a number of them have never appeared in the literature. Of these 63 cases, 47 were reported as traumatic, 5 as non-traumatic or spontaneous, and the remaining 6 were unclassified. In answer to a specific question, there appeared in this series 4 cases of hemiplegia, of which one was total and permanent, 2 transient with complete recovery, and 1 with partial paralysis remaining. The total number of cases having hemiplegia remaining as a permanent after-effect was 2, or 3.1 per cent. In the total series, considering all types of treatments, there were 5 deaths, giving a percentage of 8, which is about the same as the generally reported mortality rate. The results in all types of operation were as follows: good, 45; fair, 7; unimproved, 3; died, 5. The end result was not reported in 3 cases. These 63 cases were reported by 26 observers.

Tabulation of cases according to methods of treatment:

Partial or gradual ligation of common carotid (all methods) 16
Results:
Good ..... 14 or 87 %
Fair ..... 1 or 6.2%
Temporarily improved .. 1 or 6.2%
Deaths ..... None
One step complete ligation common carotid. 21
Results
Good ..... 14 or 66.6%
Unimproved ..... 1 or 4.7%
Fair ..... 3 or 14.2%
Deaths ..... 3 or 14.2%
(one due to pituitary tumor)
Ligation of internal carotid 11
Results
Good ..... 11 or 100%
Ligation of orbital veins 5
Results:
Good ..... 3 or 60%
(following failure of carotid ligation)
Unimproved ..... 2 or 40%
(1 developed cavernous sinus, thrombosis, panophthalmitis and had subsequent enucleation)
Untreated 6
Results
Good ..... None
Fair ..... 3 or 50 %
(one was mild and congenital, due to dehiscence in orbital wall)
Worse ..... 1 or 16 %
Died ..... 2 or 32 %
Ligation—Vessel unstated 1
Packing of orbit after enucleation and vein ligation 1
Ligation of ophthalmic artery 1
Ligation of ophthalmic veins after sphenoidectomy 1

63

Of the physicians who answered the questionnaires, 26 expressed an opinion as to the method of treatment they would prefer in event that they were to see another case.

Eight prefer ligation of the common carotid by some one of the various methods of partial ligation, preceded by a period of preparation by digital compression.

Seven prefer complete ligation of the common carotid at one step, one adding that the fundus should be observed during operation to see if pulsation ceases. Of these, three add that they favor ligation of the orbital veins if ligation of artery fails.

Six favor complete ligation of the internal carotid.

One favors gradual compression of internal carotid.

One favors ligation of the ophthalmic artery.

One favors ligation without stating vessel to be ligated.

Thus 23 of the 26 favor surgery directed toward the arterial blood supply.

One favors primary ligation of the veins, and 3 others favor it as a secondary procedure.

One advises (in case of carotid aneurysm) removal of eye, section of veins deep in orbit and packing of the same (Verhoeff). The same author advises intra-orbital ligation if an orbital aneurysm is present.

A recapitulation of the facts shows that of 37 cases treated by ligation of common carotid by either method 28, or 75.6 per cent, are recorded as yielding good results.

This is to be compared with 100 per cent in the 11 cases of ligation of the internal carotid. These 37 common carotid cases resulted in 3 deaths or 8 per cent, one of which was not attributable to the operation as such. The percentage of good results in the combined common and internal carotid ligations is 82.9 per cent as compared with 60 per cent in the vein ligations.

In the light of those figures, Locke's statistics on treatment are extremely interesting and worth calling to mind.

Of a total of 462 cases in his series in which treatment and end results are reported, 293 were subjected to ligation either of common carotid or internal carotid with a total of 27 deaths, or 9.2 per cent; and 200 cases were reported as cured or improved, giving a percentage of 68.

There were 19 cases treated by ligation of orbital veins with following results:

Cured or Improved	13 or 68 %
Negative	5 or 26 %
Deaths	1 or 5.2%

In the cases treated non-surgically, there were 150 cases with 52 improvements of 34.6 per cent, but only 1 death. Thus, while the improvement is much less certain, the reported deaths are practically negligible. These are merely condensed figures. The originals in Locke's article should be referred to for a complete understanding of this subject.

Of these 510 cases in which the end results were known, there were 29 deaths, giving a percentage of 5.7 per cent as compared with 5 deaths in 60 cases reported in my questionnaire, or 12 per cent. Hemiplegia is not reported in these results.

What conclusions can be drawn from these scattered opinions? The series of cases shows that ligation of the internal carotid is the safest and best procedure, while a very capable surgeon of wide experience says that in his experience ligation of the internal carotid is always disastrous. He has developed a new method which he has recently reported, namely tying the various branches of the carotid in such a manner as to discourage anastomosis with the opposite carotid. Another surgeon says that when ligating the internal carotid there is no need for caution because the collateral circulation is always sufficient. This we know to be too broad a statement.

A majority of opinion seems to favor some method of slow ligation of the common carotid. Among such methods may be mentioned partial occlusion of the artery with fascia lata, application of a silver band to the artery tight enough to help occlude it or the use of

specially devised instruments such as Neff's clamp, Parham's band or similar instrument. All of these depend upon either slow reduction of the blood flow or temporary complete stoppage which can be made permanent if no cerebral symptoms intervene. Deaths and hemiplegia, however, are apparently not the grave menace that an occasional unfortunate result might lead us to suspect.

On the other hand, deaths in untreated cases are not as frequent as we might be led to suppose and some spontaneous good results are reported.

Perhaps a satisfactory conclusion as to method of procedure might be stated as follows, always varied of course, according to the needs of the individual case.

1. Rest in bed with compression of the carotid artery on the affected side over a period of time sufficient to make the patient free from cerebral symptoms during the compression period.

2. During this period of preparation gelatin injections (Locke) may be used.

3. Ligation of the common or internal carotid by some one of the various methods suggested for slow compression.

4. If the above fails, ligation of the orbital veins before resorting to ligations of the opposite carotid.

Summary

1. A general résumé of the subject of pulsating exophthalmos is given with a review of the literature up to the present time, a total of 616 reported cases.

2. Two new cases are recorded, one treated by ligation of internal carotid followed by hemiplegia and death, the other untreated, resulting in at least temporary recovery.

3. Results of a questionnaire on the subject are tabulated, together with the expressed opinions of the questioned.

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SPONTANEOUS CYST OF THE IRIS

Report of a Case

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Classification of iris cysts by Tertsch and the theories offered in explanation of their origin by various authors are briefly reviewed. The case reported is of a cyst occurring in the iris of a woman 69 years of age, present many months without symptoms or loss of vision. Read before the Section on Ophthalmology of the College of Physicians, February 19, 1931.

Spontaneous serous cysts of the iris as distinguished from those due to accidental implantation of epithelial structures into the anterior chamber are sufficiently rare to warrant the report of another case. According to Tertsch[1], who reported a case from the clinic of Prof. Fuchs in 1914, these cysts may be divided into three classes.

1. Cysts which are situated in the iris stroma itself, and arise by cystoid change of endothelial or epithelial cells, implanted in the iris stroma, or by serous enlargement of cavities in the stroma. All such cysts are surrounded by iris stroma and are situated on the anterior surface of the iris in the anterior chamber.

2. Intra-epithelial cysts, arising from the pigmented epithelium of the posterior surface of the iris. The wall of these cysts is constituted of the epithelium in question, and bounded in front by the remains of the iris tissue. The cases of this nature develop backward into the posterior chamber and appear to be less common than those of the first category.

3. A new group represented by a personal case of Tertsch's from the Fuchs' clinic, due to an adhesion of one of the ciliary processes to the posterior surface of the iris. The cavity thus formed tends, when closed, to enlarge and form a cyst. The wall of these cysts is chiefly made up of the tissue of the ciliary processes, and to a lesser extent by the iris. They lie outside the iris tissue and develop either forward or backward, at times equally in both directions.

Tertsch collected from the literature 51 cases of spontaneous iris cysts, 37 of which belonged to class 1. Of these 37, six arose in the first year of life, 13 between the second and tenth years, and 16 in later life. They usually appear on the anterior surface of the iris as cystic, grayish white, shining masses, which grow quickly into the chamber, and reach from the angle of the chamber nearly to the pupil margin. The cyst often encroaches on the posterior surface of the cornea, and fills the corresponding part of the anterior chamber. In almost all the cases, the anterior wall of the cyst is described as transparent, with a few pigmented remains of the iris tissue. The posterior wall is thickened, and formed by the iris tissue. Such cysts arise often without any, or at times with a rapidly disappearing irritation of the eye. Increased tension has never been observed.

Twenty-two of the cases collected by Tertsch had been examined histologically, and short résumés of the cases are given in his comprehensive article, together with the bibliography. In all, the anterior wall is found to be thin, consisting of one or more layers of a hyaline appearing membrane, to which remains of the iris stroma are attached, and lined with epithelial or endothelial cells, which are usually much flattened. The posterior wall, on the other hand, consists of very broad uveal tissue, which is lined posteriorly in many instances by a double layered pigment epithelium, sometimes by cells like the epithelial cells of the ciliary processes. In some cases diverticula are present, in which nests of partly pigmented, and partly non-pigmented cells are often present.

The remaining 15 cases were only observed clinically, but agreed com-

pletely with the others in their appearances.

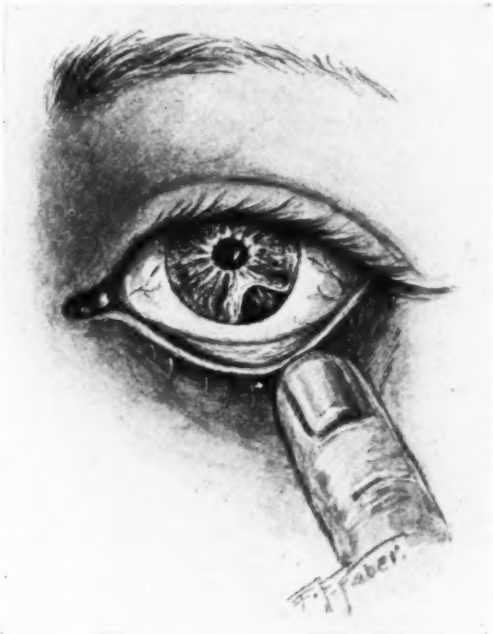
Intra-epithelial cysts. Fourteen of these have been described (ten with histological examination). They appear later in life, are concealed for a long time behind the iris, and are only diagnosed after the occurrence of increased intraocular tension. Clinically there may be a protrusion of the iris, and on dilatation of the pupil, a brownish structure may be observed, which in some instances has been considered sarcoma, and the eyes therefore enucleated. At times they may protrude into the pupil, as in a case illustrated by de Schweinitz in his text-book.

My own case belongs to group 1 and the history is as follows:

Miss A. F., aged 56 years, was first seen by me in May, 1918. She had been a weaver, and while in good general health, had suffered with considerable headache at her work. She was given glasses, correcting a myopia of 1.75D. in the right eye, and a myopic astigmatism of .50D. cyl. ax. 90° in the left eye, with which she had 5/4 vision in each eye; a bifocal segment was added for near. The ocular media were clear, the eyegrounds normal, and no abnormalities were noticed in either pupil or iris. At subsequent visits in 1922, 1924 and 1927 changes were made in the glasses, the refraction of the eyes in 1927 being noted as — 0.75 D.S. in the right eye, a gradual reduction of 1 D. from the 1918 examination, and of + 0.50 cyl. in the left, vision remaining 5/5 easily.

On January 12, 1931 she came for another examination, and exhibited what she called a dark spot in the left eye. She gave a history of an operation by Dr. Bristol at the Hahnemann hospital for obstruction of the rectum. I have since learned that at the operation an inoperable carcinoma of the rectum was found, and a colostomy was therefore performed. The spot in the eye had appeared months previous to the visit; there was no history of traumatism, redness of the eye, pain or any discomfort whatever. Vision with correction was still 5/5 (the hyperopic astigmatism in the eye having increased to 1D. at axis 15°.)

Examination of the eye showed a clear cyst at the ciliary border of the iris below, which had torn the iris from its ciliary attachment, pushing it upward and causing it to buckle or protrude forward, and displacing the pupil upward, so that it was horizontally oval. Anteriorly the wall was transparent, and crossed by fine trabeculae



(Shumway). Cyst of iris.

of what appeared to be delicate fibers of the iris stroma. Anteriorly it impinged on the cornea, which was nevertheless clear. Its posterior wall appeared to be bounded by the deeply pigmented cells of the posterior iris epithelium. On dilatation of the pupil, there was no evidence of the cyst in the pupillary area. The eye was quiet, tension was normal, and the eyeground showed no abnormality.

Slit-lamp examination by Dr. Alfred Cowan brought the following description: "It can be seen that there is a transparent substance lying between the posterior limiting membrane and the stroma of the iris. The anterior wall is so atrophied that it consists of an extremely thin, transparent membrane, with a few gray strands, representing

what were probably the trabeculae. This surface of the cyst comes so far forward that it is in contact with the cornea for some distance. There are several new blood vessels traversing the whole surface. The depth of the cyst is about three millimeters.

The posterior wall consists entirely of the limiting membrane with the retinal pigment layer behind it. This shows the effect of stretching or atrophy, in that there are a series of translucent linear spaces, separating islands of pigment."

In the diagnosis there might be some question because of the complication in the presence of what is probably an adeno-carcinoma of the rectum. But, in the first place, search of the literature has shown that no cases are on record of metastasis of carcinoma to the iris, without involvement of the choroid at the same time: and in the second place, the cyst is entirely transparent, and there is no evidence in it of a solid growth, so that the case is to be placed in Class 1 of Tertsch's classification.

Treatment has usually consisted in operative removal of the cyst, together with the portion of the iris on which it is situated, after incision with a lance knife. One operator (Schoeler)[11] proposed to inject the cyst with tincture of iodine, and successfully treated one case in this way. In the British Journal of Ophthalmology for Sept. 1925 (Vol. 9. pp. 450-54), D. J. Wood[2] reported two cases in one of which, in a young girl the cyst was punctured but recurred, and was later removed with part of the iris. The drawing given of the case closely resembles mine. In another case an Indian surgeon injected carbolic acid into the cyst, then withdrew the solution with another syringe, and immediately injected salt solution. In the present instance, the age of the patient, the serious intestinal condition, which is under treatment by X-rays, and the absence of ocular discomfort would appear to make operative interference unnecessary. Such cysts have been observed for long periods of time, without causing disturbance of vision or ocular discomfort.

According to Tertsch, the greater number of the older authors considered the cysts to be mesoblastic structures which arose by closure of crypts on the anterior surface of the iris by the endothelial cells which are a continuation of the cells lining the posterior surface of Descemet's membrane. These cells cover the entire surface of the iris, as far as the pupillary margin, and are deficient (Fuchs) only at those spots which correspond to the crypts, including both those at the pupillary and those at the ciliary margin. These have been termed stomata, although Quain[12] considers it doubtful if they are analogous to the openings of the same name, which occur in serous membranes and communicate with subjacent lymphatics.

The lining cells have been thought to arise from the endothelium which passes inward normally when the edges of the crypts are flat. (Schmidt-Rimpler[3], Ginsberg[4] and Collins[5]). These cysts were therefore considered as lymph retention cysts. Ginsberg[4], Terrien[6] and Monzon[7] believe that another lymph space besides the iris crypts may be blocked off, and that then the so-called Fuchs' cleft plays a rôle. This cleft divides the iris stroma into an anterior layer (crypts) and into a posterior layer. To these cysts the name of "cleft cysts" has been given by Streiff.[8] In a case reported by Engelen, the author considered the cyst described by him to be an exudation cyst, the result of a hemorrhage into the iris at birth.

In contrast to these theories, cases in the older literature have been considered true epithelial cysts, arising within Fuchs' cleft by growth of epithelium implanted there by traumatism. Nadal[13] thought that in his case the cyst which was spontaneous had arisen from germ cells from the lens, which had been displaced into the iris.

In a third group of later publications, however, the theory is advanced that the origin of spontaneous cysts in the iris may be explained by an implantation of parts of the secondary optic vesicle into the iris. Juselius[9], for example, assumed that a spontaneous epithelial iris cyst could arise from the anterior layer of the posterior pig-

mented cells of the iris, or from such remains of the ectodermal layer, which during the embryonal period had not been converted into iris muscle tissue. These ectodermal rests could remain latent, and later from one cause or another, at birth, or at a later stage, take on activity and develop into cystic tumors. In fact such a finding was discovered by Lauber[10] in a cat embryo, of a growth arising from the anterior layer of the pigment epithelium, in the middle of which there was a cystoid cavity.

These various theories are of interest, but Fuchs sums them up in his textbook as follows: "We have as yet no certain explanation for the development of cysts, except for the most ordinary kind, namely, the traumatic cysts, due to ingrowth of epithelium in wounds or in operations on the cornea," and most authorities still accept the view expressed by Collins[5], in his article on intraocular cysts in 1890, that "the crypts of the iris are lymph channels, through which lymph streams into the anterior chamber, as was demonstrated by Schick in experiments with injection of fluorescin in rabbits. Anatomical researches have shown that these pits in the iris are frequently bridged over in front by bands, or completely by a thin membrane. It seems legitimate to assume that such a membrane might become thickened as a result of disease, and thus the outlet of the crypt be occluded; the same pathological conditions might block any lateral communications between the crypt in question and adjoining ones, and the lymph would be unable to escape into the aqueous. The endothelial lining of the cysts, under the irritation of the enclosed lymph would increase and become in places stratified."

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ROENTGEN THERAPY IN PITUITARY TUMORS

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Though not exactly ophthalmological this subject is so closely allied to ophthalmology as to justify its inclusion in an ophthalmological publication.

Pituitary tumors are more amenable to roentgen therapy than tumors elsewhere in the head. In many cases so treated since Gramegna reported the first case in 1909 there has been improvement in the characteristic symptoms. Eye conditions have been better subjectively and objectively. The visual field record has proven a valuable means of gauging improvement. Color fields have been first affected and first to recover. Polyuria, glycosuria and genital dystrophy have improved. Skeletal changes of acromegalia have not been affected except as to arrested progress. Solid adenomas have seemed more radio sensitive than the cystic forms. High voltage irradiation through several small portals of entry has been employed. Six cases so treated are reported in detail. Three of these were much helped by the treatment. One required operation and two had been under treatment only a short time with some improvement. Read before the Section on Ophthalmology of the College of Physicians, Philadelphia, December 18, 1930.

Pituitary tumors are of especial interest to the roentgenologist, because by means of the roentgen rays, one obtains some of the most valuable diagnostic evidence and because these tumors are the most satisfactory of all brain tumors for radiation therapy. Briefly, the diagnostic evidence depends upon some enlargement, destruction or deformity of the sella turcica, which is produced by the pituitary tumor. Fortunately, these pituitary tumors, either sellar or suprasellar, can be rather definitely localized, and since they are almost centrally located in a spherical body, the head, one can crossfire as much as is needed. As a rule, they are more radiosensitive than tumors elsewhere in the head.

We know that acromegaly is usually due to adenoma of the anterior lobe, while dystrophia adiposogenitalis is usually due to suprasellar hypophyseal tumors which are often indicated by lime deposit. (Mackenzie, Sosman, and Hirsch.) In some cases, however, the location of the tumor is best indicated by a careful ophthalmological study.

The first case treated by the roentgen ray was reported by Gramegna in 1909, in which temporary improvement was reported and then ultimate failure. Béclére, in 1913, was the first to establish roentgen therapy as a definite method of treatment of pituitary tumors. He treated a sixteen-year-old girl, whose case was not diagnosed as acromegalia, but as gigantism with genital infantilism associated with defective vision and atrophy of the papillae and enlargement of the sella. She was treated during a year, through the two temporal areas and through two frontal fields. Her field of vision increased more than threefold; the menses appeared; the breasts and pubic hair developed. She was able to see to read and write and live a normal life. The important fact is that this improvement has continued approximately twenty years. Since these reports, there have been reports of successful treatment by at least seventy-six authors. Therefore, we are not pretending to add anything new, but we shall try to review some of the important observations and add some confirmatory evidence. Marburg and Sgalitzer state that while more than 200 cases are reported, not all are truly hypophyseal tumors, and yet the great majority have shown improvement.

Results of roentgen therapy

The pressure symptoms and the eye symptoms are especially relieved. The headache is often helped after a single treatment. Of more striking importance, however, is the improvement in the eye conditions which has been observed by practically all authors. This

differs in degree, and not all cases are benefited by irradiation. Grant says, that the x-rays do not influence the Rathke's pouch tumors; most of these are cystic.

The eye symptoms show both subjective and objective improvement. The patients report that they see better and can do things which they could not do previously. The fields of vision as recorded by the ophthalmologist usually show progressive betterment, but often show considerable variation, and at times as in some of our cases, there has been further contraction for a time and then definite improvement.

The most satisfactory method of gauging improvement, in our opinion, is the record of the field of vision from time to time. In early cases or the more acute cases we think this should be done once a month, but in the other cases a record once in three months is probably sufficient. The total field of vision may remain contracted and yet bitemporal hemianopsia may disappear or at least improve (Michakowsky). The same may be true of bitemporal scotoma (Magnus). Even with amaurosis and optic nerve atrophy, improvement has been observed. (Gavacceni, Herrnheiser, Bertolotti, Nemenow and Jugenburg, Strauss, and Marburg and Sgalitzer). It has been observed that during the progress of these tumors the field for red is first and most affected, then the blue, and then the white or form field. The recovery in reverse order affects first and mostly the form field, and last the field for red.

Polyuria and glycosuria have been observed to decrease or disappear by a number of authors. (Gavazzeni, Roussy, Bollack, Laborde, Levy, Strauss, Allen, R. Emmet and Lisser, Nemenow and Jugenburg).

Regarding the genitaldystrophy, it has been noted that the menses have returned after amenorrhoea in cases reported by Béclére, Sanderow and Koppelmann, and Nemenow and Jugenburg, and impotency was found to decrease by Bertolotti, Biro, Artom and Balaffio, Solomon, Nemenow, Marburg, and Sgalitzer.

The skeletal characteristic of acromegaly shows practically no change and one can only expect an arrest of the progress. The sella itself shows no evidence of return to normal.

Recurrences may take place as occurred in the first case, reported by Gramegna, and also in the case by Bertolotti. A case treated by Solomon in 1917, 1918, 1919, remained well until 1927 when a recurrence of symptoms developed, and then improvement again took place under treatment during 1927 and 1928. There are cases also which showed improvement in the beginning of radiation therapy and then grew worse and were only relieved by operation. (Weve, Gilbert). There are also recurrences of symptoms following operation which have been relieved by irradiation as has been reported by Alberti and as is shown in (cases 1 and 3) treated by one of us (Pfahler) in 1920. These patients have been relieved of symptoms during these ten years. The case which has been under observation longest is that by Béclére, which has been relieved of symptoms during twenty years. Many cases reported have remained well over a number of years.

Dystrophia Adiposogenitalis

In this condition as in acromegalia all cases do not respond to irradiation. Failures have been reported by Strauss, Carlotti, Roussy, Bollack, Laborde and Lévy, and by Heinismann and Czerny. Improvements have been reported by Küpferle, Darier, Ascoli, Rauschberg, Souques, Moquin and Walter, Van Lint, Vocher and Denis, Wehefritz, Flatau, Roussy, Bollack, and Laborde.

Marburg and Sgalitzer have collected 40 cases of dystrophia adiposogenitalis in which as a result of the irradiation there was an improvement in the general condition and in the eye symptoms, but in only a few cases was there improvement in the adiposis. The genital symptoms have shown some improvement and Nemenow and Jugenburg, have reported improvement in the diabetes insipidus. The earlier the treatment is applied the better should be the results.

In dystrophia adiposogenitalis the

symptoms begin earlier in life, sometimes before the tenth year, but generally before the 30th year. In all cases the eye symptoms are most marked and in women there is associated amenorrhoea. The response to treatment is irregular and with our present knowledge cannot be predicted in advance.

Ophthalmic syndrome or chiasmatic syndrome

This group of cases is not clearly defined either as to the nature of the disease nor as to the response to roentgen therapy. In general, a large percentage of these cases will obtain from the roentgen therapy relief or improvement in the headache, betterment in the eye and general symptoms. In many of these cases reported, there has been no improvement.

The radiosensibility of pituitary tumors

In general, the adenomas seem to be radiosensitive, excepting when they are cystic. Heuer, found at operation that 80 per cent of true pituitary tumors were solid adenomas, 20 per cent were cystic adenomas. Suprasellar growths were a mixture of gliomas, solid and cystic epitheliomas, and a few sarcomas. Towne, refers to Cushing's statistics as showing that 20 per cent of pituitary adenomas are cystic and that 20 per cent of Cushing's operative cases conserved useful vision for more than five years while the remaining 80 per cent did not regain useful vision or had recurrences after a period of about two years. These statistics suggest that surgery is especially useful when a cystic adenoma is present and this statement is definitely made by Grant. Fortunately, it seems that the adenomas which are not cystic are the ones which are sensitive to irradiation. Therefore, irradiation and surgery can supplement each other. Küpferle and Szilly report an endothelioma which was sensitive to irradiation and relief from symptoms followed irradiation therapy. Cantonet and Jolly believe that the carcinomas of the anterior lobe are insensitive. Many authors have found that the cystic adenomas are not sensitive to irradiation. (Wehefritz, Müller and Czepa, Bailey, Towne, Béclére, Bremer, Solomon, and Grant).

Since it is impractical to do a biopsy in advance, or in any way to know the exact nature of the tumor it would seem wise to give preliminary irradiation. Response within six weeks would be justification for continuing the irradiation within safe limits under the observations of the ophthalmologist and the neurologist. If there is no response during this time, operation should be considered. Towne believes that these observations should be continued for six months before operation.

Technique for irradiation

The technique for irradiating pituitary tumors during these 21 years has, of course, undergone much change or evolution. The early cases could not possibly have been treated by modern technique, because the equipment and knowledge were not then available. Based upon present knowledge and with the available equipment, the general principles governing the technique should be the following:

1—The irradiation should be delivered into the diseased area with the least possible damage to the overlying tissues. This demands high voltage (200 K.V.) irradiation, using 0.5 mm. to 2.0 mm. copper filter, at a focal skin distance of from 40 to 50 cm.

2—The portal of entry should be kept as small as is practical to include the diseased area, and since these tumors are usually not very large and the location fairly accurately known, a field of 4 to 5 cm. in diameter should be sufficient. The number of portals of entry as well as the dosage through each field will depend upon the dosage required. Generally, we recommend treatment through each temporal region, and through the frontal and interocular region.

3—In cases with slowly developing symptoms, it would seem advisable to use relatively small doses over a longer period. In such cases, a 25 per cent to 50 per cent of an erythema dose (162

R. with 0.5 mm. Cu. and 212 R. with 2 mm. Cu.) given through each temporal region and through the frontal region and repeated weekly until 200 per cent has been given will probably be sufficient. In the cases in which the symptoms have developed rapidly, it is advisable to give this irradiation in about half the time. If the lesion is believed to be malignant it may be well to increase the dosage in the tumor area by adding irradiation from the parietal region, and radium applications from the pharynx. In some of our cases we have given a total of approximately 400 per cent to 500 per cent of an erythema dose at the skin and about the same in the tumor area within a period of two years without any damage.

Report of Cases

Case 1. Mr. A. G., aged 44 years, referred (to Dr. Pfahler) by Dr. C. H. Frazier, April 9, 1920, on account of recurrence of symptoms following an operation. This patient had been operated on by Dr. Frazier in August, 1917, through an osteoplastic flap in the right frontal region. He remained well until May, 1919, when violent headaches returned, chiefly diurnal. The headaches were localized almost entirely in the right frontal region and were aggravated by hot stuffy rooms and by nervous excitement.

This patient was treated by low voltage technique (130 K.V., 6 mm. al. filter at a distance of 25 cm.) through six fields of entry on each side of the head, frontal, region and face, directing the rays toward the sella tursica. Each series of 12 doses (50 per cent S.E.D.) was given once a month on 4 successive days. At the end of 2 months definite improvement was noted by Dr. G. E. deSchweinitz, and after 3 months Dr. B. F. Baer reported: "His central vision in the left eye is now normal. Before his last operation there was a complete loss of the upper, outer field of vision in the left eye, while today there is a perceptible increase in this portion of the field." He advised a continuance of the treatment. Within a year the patient received five series of treatments, and an application of 100 mg. of radium into the pharynx for 1 hour, filtered through platinum and rubber, and inserted through nares. (By x-ray examination this was found to be 2 cm. from the sella). At the end of this time he said that he felt better than ever and he returned to work. He had almost complete amaurosis in the right eye when he first came under observation and this was complete when he came for x-ray treatment.

He developed some exacerbation of symptoms and received another small series of treatments during June and July, 1921. An examination made April 7, 1923 showed him free from symptoms. The vision had not changed in two years. When examined November 26, 1930 he was free from any symptoms, and in good general health, ten years after recurrence of symptoms following his operation. Repeated and recent x-ray examinations show no appreciable change in the sella, as compared with the original films made April 9, 1920, at which time it measured approximately 30 mm. in its antero-posterior diameter and 20 mm. in the vertical diameter, with depression of the floor, but no erosion.

Case 2. Miss A. B., aged 29 years, was referred to Dr. Pfahler on October 18, 1920, by Dr. C. E. De M. Sajous, and Dr. Wm. R. Brown for examination and treatment on account of acromegalia. Enlargement of the face and hands had been first noticed by the family three years previously, and menstruation had not occurred for one and one-half years. The patient also complained of facial neuralgia and headaches.

The x-ray examination showed great enlargement of the sella with extension upward and backward of the posterior clinoid processes, and erosion of the floor of the sella.

The patient was treated with low voltage rays as above, except that 10 mm. of aluminum filter was used, 30 cm. distance, and 45 minutes exposure over each of 4 fields—one in each temporal region, one through the frontal and one through the nose and interocular region. The patient was first treated

November 16, 1920. At the beginning of the 2nd series December 14, 1920, her headaches had disappeared, and the puffiness of the feet and nose was reduced, but the eye symptoms had was 1/100. Her vision at present time is but 1/300. In my original fields she still had a nasal field, and when I saw her about a month later this nasal field was still practically retained but macu-

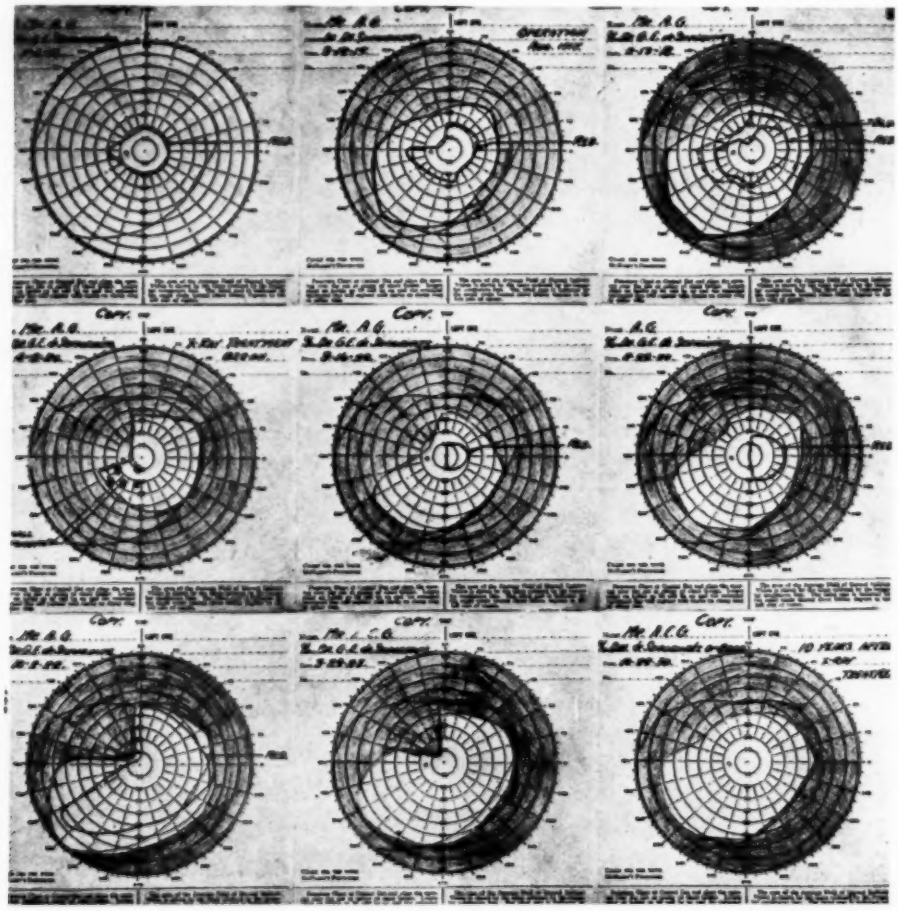

Fig. 1 (Pfahler and Spackman). Case 1 shows a series of records of the field of vision as recorded by Prof. G. E. deSchweinitz and his associate, Dr. B. F. Baer, Jr., from time to time, from May 3, 1916 to October 20, 1930. In the first field of vision made May 3, 1916, the contracted red fields are shown. The second field made September 18, 1917, was made one month after the operation by Prof. Chas. Frazier, and shows a definite improvement in the red field. This was followed by further improvement shown in the field recorded February 13, 1918, but by April 8, 1920, there was a definite contraction of the total field of vision to about one-third, and at this time, x-ray treatment was begun. The following fields of vision made September 16, 1920, November 22, 1920, October 2, 1922, March 29, 1923, and October 20, 1930, show a progressive increase in the fields until it is practically normal; it has remained approximately normal during eight years.

grown worse. March 25, 1921, Dr. T. B. Holloway wrote, "The right eye has slipped considerably; probably less in reality than her fields would seem to indicate. Original vision in right eye lar perception had been cut out. Today, no field whatever could be plotted on the perimeter, on account of her very low perception with this eye. I think it is worth commenting on that the

block of the fibers for the right eye was so marked when she came under observation that but a slight increase would be capable of producing a rather marked field change. In the left eye the fields have held fairly well, although those for red and green have assumed a hemichromatopsia type. The vision of the left eye is 6.9ths. The pupillary changes are about as before, no ocular palsies and no distinct difference can be noted in the character of the discs". March 20, 1921, x-ray examination showed no change in the sella. April 13, 1921, her subjective symptoms were worse than ever and she complained of a "sense of burning or something alive in the middle of the head". The patient had been given a total of four radium treatments in the pharynx, and six series of x-ray treatments ending May 13, 1921. It was then advised that if no improvement occurred within three weeks an operation be done. May 29, 1921 Dr. Holloway wrote, "Patient came to me again during the past week. I found the vision of the right eye reduced to shadows, and the left eye to 6.9ths. The pupils and intraocular conditions were much the same as at the time of her last examination. The form field of the left eye was holding quite well, but there was a hemichromatopsia for red and green, with a complete superior temporal quadrant defect for blue. Since the previous examination the blue field has become slightly more defective".

June 30, 1921, Dr. Frazier writes, "The patient has been discharged from the University Hospital today after a subsellar decompression and a partial hypophysectomy. Her convalescence has been in every way uninterrupted and she was quite free from the usual discomforts. A crude test of her vision showed that there is already a striking improvement in the right eye. We would hardly expect any improvement in the left". The patient continued to improve after the operation, but died of pneumonia in 1924.

Case 3. Mr. A. T., aged 49 years, was referred to the radiological clinic of the Graduate Hospital April 17, 1928 by Dr. G. Oram Ring. In December, 1926, the patient first noticed what he described as a deflection of vision if he looked straight ahead. Later he began to notice that he would stumble over things and did not see the ground. Shortly afterward he began to have frontal and occipital headaches, with a neuralgic type of pain in the face. The symptoms had progressed until he was

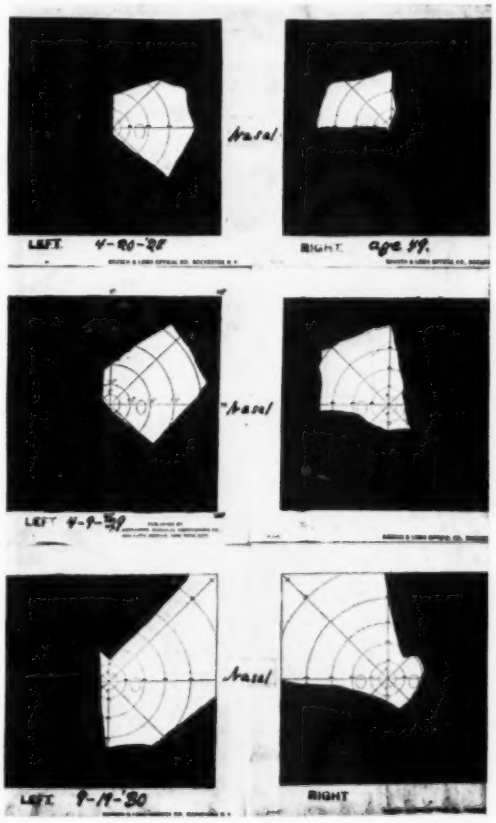

Fig. 2 (Pfahler and Spackman). Case 3 is a record of fields of vision as studied by Dr. G. Oram Ring, and made April 20, 1928, April 9, 1929, and September 19, 1930, which show a progressive increase in the nasal field of vision to about fourfold, and this improvement has been associated with freedom from other symptoms and ability to carry on work.

referred for x-ray treatment. The hands and face had the typical appearances found in acromegalia. The fields of vision were markedly contracted at the beginning. The illustrations show the progressive increase under x-ray treatment.

In this case the high voltage tech-

nique above described was used (200 K.V.—filter 0.5 mm. cu. x 1 mm. al. and 50 cm. distance) with 50 per cent S.E.D. doses given over each temporal region and through the frontal region, and was given on the principle of the saturation technique (Pfahler), so that within a month 225 per cent S.E.D. was given through each of the three fields which gave approximately the same dose in the tumor area. At the end of this series, the field of vision in the left eye had increased 50 per cent and that of the right eye had increased 100 per cent. The patient felt better in every way. This increased response to irradiation, we believe, was due to the increased dosage according to the saturation method. The treatment caused a complete temporary alopecia over the areas treated, but the hair had regrown at the end of 3 months.

The fields of vision were recorded from time to time. Six months after beginning treatment he began to lose ground. At this time he was working as a salesman, and in addition was nursing his wife at night during five months' illness which terminated in her death. Even during this strain his headaches did not return. Treatment was renewed October 22, 1928 and was given at intervals until March 20, 1930, during which time an additional 400 per cent was given over each of the three areas making a total of 625 per cent. These fields were approximately 6 cm. in diameter and because of these small areas, and high filtration no skin damage has resulted. September 19, 1930, the patient said he had not felt so well for many years. He was able to work. His fields of vision were five or six times as large as at the beginning of treatment.

Case 4. Mr. S. C., aged 40 years, was referred April 6, 1928 by Dr. Patten, from the Dr. T. H. Weisenberg's Neurological clinic to the Radiological clinic (Dr. Pfahler) at the Graduate Hospital. The patient complained of pain in the left eye December, 1925, and in a year the right eye also was involved. Then vision began to fail. Potassium iodide gave no relief.

The ophthalmic examinations at Wills Eye Hospital showed optic atrophy in both eyes, with dilated veins, and bitemporal hemianopsia.

The neurological examination showed the pupils irregular, but they reacted well to light and accommodation. The motor and sensory functions of the 5th nerve were normal. The 8th, 9th, 10th, 11th, and 12th nerves were normal. The movements of the left hand were more awkward than the right. The Barany test April 12, 1928, indicated a suprasellar lesion possibly involving the pituitary.

An x-ray examination of the sella made March 27, 1928 and one made September 21, 1928 showed no appreciable change. Both showed great enlargement. Both the vertical and the antero-posterior diameters measured approximately 20 mm. This patient received deep x-ray therapy approximately the same as in Case 3, getting about 300 per cent S.E.D. over each of the three fields, and about this same dosage in the tumor area. The last treatment was given April 3, 1930. The treatments relieved the patient of all subjective symptoms and his fields of vision increased about 300 per cent. He was allowed to return to work.

Case 5. Miss. E. T., aged eight and one-half years, was referred May 9, 1930, from the neurological service (Dr. Weisenberg) to the radiological service (Dr. Pfahler) for x-ray treatment, with the diagnosis of pituitary tumor.

The child had been unusually small until the past two years when she grew very rapidly. One year before admission the mother noticed growth of hair in the axilla and pubic regions, with enlargement of the breasts, and she had the physical development of a woman, but with no corresponding increase in mental development. Eyes: extraocular movement normal. Pupils react to light and accommodation. Fundi very hard to examine, but both discs have very sharply defined edges, and have a chalk-like whiteness, the left being whiter than the right. She read ordinary writing at a distance of one-half foot, but with difficulty; right eye at two feet fairly readily. The oph-

thalmic examination was made by Dr. Spaeth, service of Dr. L. C. Peter, at Graduate Hospital Clinic.

Neurological examination: Precocious, physical development of eight-year-old girl so that she appears to be twelve to fourteen years of age. Eye signs indicating a fairly far advanced secondary optic atrophy. All reflexes normal.

X-ray reports: May 6, 1930. The skull bones are of average thickness. There is no convolutional atrophy, localized pressure effect or intracranial calcification visible. Pituitary fossa measures 1.7 cm. antero-posteriorly and 9mm. vertically, which is larger than can be considered normal. It is a flat type, with anterior clinoids well developed. The posterior clinoids are short and appear stereoscopically to be slightly bent posteriorly, as though pressure effect had been exerted upon them by a mass within the sella. There is no distinct erosion of the floor or dorsum of the sella. From the x-ray standpoint a pituitary tumor should be considered probable. May 12, 1930—Examination of the head after air injection: The air has entered the cysterna magna and passed forward filling the 4th ventricle, the 3rd ventricle, and both lateral ventricles, with the exception of the inferior horns. The 3rd ventricle appears slightly larger than usual. The lateral ventricles are normal in size and the midline structures are not shifted either way. The air has also passed posteriorly filling the cysterna venae magnae cerebri which are well visualized. Anterior cortical pathways are well marked and appear normal on the right side. On the left side, there is a collection of air just lateral to the sagittal suture, which indicates a retraction of the brain from the cranial wall approximately 6 mm. The area is 4 cm. in width. In the lateral view, this appears to be spread fairly widely over the parietal region and there is a small collection also seen below the right frontal area. This would indicate a localized atrophy in this region. There is no block demonstrated in any portion of the ventricular system.

June 2nd, 1930—Examination was made of both optic canals in cross section for comparison. These proved to be normal.

We have treated four other cases, but three patients disappeared immediately after the beginning of treatment, and the fourth is doubtful in diagnosis and has only been treated a short time. They are, therefore, of no value for record.

Case 6. Mrs. E. H., aged 24 years, referred from the neurological service (Dr. T. H. Weisenburg), to the radiological service (Dr. G. E. Pfahler) August 13, 1930, with the diagnosis of suprasellar tumor, and with the following general history: (Notes furnished by Dr. T. H. Weisenburg) "Admitted to Graduate Hospital July 16th, 1930. Discharged August 14th, 1930.

CC: Edema of ankles—1 year duration. Dyspnea on exertion. Biliousness, headaches, frequent, occipital and frontal eight hours duration. Dizziness past three years. Hot and cold flashes in face. Intense pain in moving from bent position to erect. Transient paralysis of arms and legs, three years. Transient paraesthesias, three years. Extreme nervousness and irritability.

PH: 1922 appendectomy and salpingectomy; has not menstruated since. Prior to 1923 had no headaches, no convulsions. Suffers frequent dizzy spells; has attacks of unconsciousness.

PE: Slight coarse nystagmus in looking to right and left. No facial weakness. Fingers are thick but taper; no clubbing. Reflexes slightly hyperactive.

PI: For three years has had frequent attacks of vertigo with unconsciousness; hot and cold flashes have been present for past three years. Transient paralyses and paraesthesias have been present for same period. Frequent severe headaches daily. Bilious for two years. No vomiting. Two years ago noticed she was looking older. Since then voice has progressively coarsened; hair has begun to grow over body and features are steadily broadening and becoming coarse.

Dr. Peter's examination: July 16-30—No proptosis; no ptosis; no lagophthalmos; convergence good; no impairment of ocular motility; con-

junctivae and corneae normal; pupils equal, round; reflexes normal; tension normal.

Fundi: Media clear; discs oval, upper and nasal margins blurred, more in left than right; very small physiologic cups; vessels slightly tortuous but otherwise normal. No hemorrhages or exudates. Vision O.D. = 6/12ths, O.S. 6/15ths. Fields show an irregular bitemporal hemianopsia.

Diagnosis: Suprasellar tumor. Patient recommended to Dr. Pfahler for x-ray treatment.

An x-ray examination made July 25, 1920, shows apparently a depression downward of the anterior clinoid process. The sella is smooth in outline; the antero-posterior diameter is approximately 9 mm. The vertical diameter approximately 5 mm. The posterior clinoid processes are relatively large. The cranial bones are thicker than the average for a woman, otherwise, nothing abnormal is shown.

This patient was referred for x-ray treatment on August 13, 1930. There was 210 per cent of an erythema dose given through each temporal area, directed toward the pituitary region, the first dose having been given August 13, 1930, and the last dose given September 8, 1930. The patient on October 2, 1930 showed some improvement in vision but the headaches were not improved, and seemed to be getting worse. Therefore, we have discontinued the x-ray treatment for the present.

Summary and Conclusions

1—Good results in the treatment of pituitary tumors have been reported by at least 77 authors, but the successful cases do not respond equally.

2—The solid adenomas usually respond. The cystic adenomas do not respond to this treatment. An endothelioma has been successfully treated. Some tumors that have not responded have been found to be carcinoma or sarcoma.

3—The surgical statistics seem to show 20 per cent of permanent recovery, while 80 per cent are followed by recurrent symptoms. Heuer's statistics show 20 per cent of the operated cases to have been cystic adenomata. It seems that the cystic adenomata are responsive to surgery and the solid adenomata are responsive to irradiation.

4—Since surgery involves great risks, and since irradiation shows no mortality and in skillful hands should involve no damage, it would seem advisable to treat with the high voltage x-rays first and keep the patient under observation for from six weeks to six months, and operate if there is insufficient response to irradiation.

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STRETCHING THE OPPONENT MUSCLE AS PART OF ROUTINE TREATMENT OF CONVERGENT SQUINT DUE TO ERRORS OF REFRACTION

M. E. SMUKLER, M.D.
PHILADELPHIA

When convergent strabismus exceeds fifteen degrees in children past the age of twelve or thirteen years, the author finds the most effective procedure to be a tucking of each external rectus with vigorous stretching of the internal recti. Read before the Philadelphia Pediatric Society, November 11, 1930.

The treatment of squint is always a troublesome question. Textbooks and other literature are vague on the subject of a well-defined procedure in caring for the different forms of squint. There seems to be no attempt made for some sort of working guide to treat the many variations that present themselves.

It is no wonder that the family physician, who is often consulted first, may wrongly advise the parents of children. There is a general impression, confined not merely to the laity but shared by many general practitioners as well, that squint is often outgrown. It is unfortunate that only too frequently children are referred to the ophthalmologist when it is too late to give them the benefit of nonoperative measures. When the ophthalmologist is consulted glasses are frequently ordered. But the parents, thinking that the appearance of the child may be made worse by the glasses, usually then consult a charlatan, who promises to cure the child without the use of glasses; the deluded parents thus lose the only chance the child had to be cured by nonoperative means.

During the past fifteen years it has been my privilege, in my private practice, hospital service, and the eye dispensary of the public schools in Philadelphia, to personally examine, treat, or follow up about six thousand cases of squint. Having so many cases under my personal care, necessity prompted me to develop a routine procedure that offered the best prospects for success in conserving vision and removing the deformity. My personal observation is that the routine method now used by me has given the best and most uniform results in the most cases of squint.

In this paper I shall deal with convergent squint only (the constant unilateral, occasional and alternating variety) resulting from errors of refraction. Other forms of squint, due to other causes, will be discussed in another paper.

It is obvious that nonoperative means to correct this condition should be employed first. By these methods we endeavor to improve the vision of the deviating or amblyopic eye, to train the fusion sense, and to restore the normal parallelism of the axes. The results in many instances depend on how early the treatments are instituted.

The routine treatment by the nonoperative method is conveniently summarized as follows:

(1) The first thing to take care of is the correction of any refractive error by ordering properly fitting glasses. I usually order glasses at the age of three years, for I find this to be the earliest suitable age. The refraction must be done by retinoscopy under a cycloplegic. Glasses alone frequently correct the squint, but do not cure or prevent amblyopia from developing in the deviating eye.

(2) If a child has squinted for a long time, or if the visual acuity of the affected eye is reduced, an attempt should always be made to restore (as far as possible) the sight of the deviating or amblyopic eye. An efficient way to do this is by occluding the fixing eye. This method is usually known as "occlusion of the fixing eye". The most practical way to do this is with a special frame (figure 1), so fitted that the frosted lens closely hugs the nose and cheek,

making it impossible for the child to peep through the nasal side. A correcting lens is ordered for the affected eye. Occasionally the squinting eye has a smaller refractive error than the fixing eye.

Another method of occlusion is to put a pad with adhesive over the fixing eye. This is objectionable because it can only be used in selected cases and is not convenient for wearing a correcting lens over the other eye at the same time.

Fig. 1 (Smukler). Specially constructed and fitted frame used in the occlusion treatment.

The occlusion treatment brings the best results in children from two and a half to three and a half years old; it must be continued from two to four months, though further persistence is often rewarded with success. This treatment may be tried until the age of six. Improvement in vision may be noted at the end of a month.

(3) Another exceedingly efficient measure to prevent the deviating eye from becoming amblyopic is to atropinize the fixing eye until the visual acuity in the squinting eye becomes equal to that of the fixing eye, or until no further improvement can be obtained. Correcting glasses are worn over both eyes. The best results are noted between the ages of two and four. After six years of age not much improvement can be looked for, although I have seen a few rare exceptions to this rule in slightly older children. I usually atropinize the fixing eye after the occlusion treatment.

(4) In conjunction with the correction of the refractive error in reestablishing parallelism of the visual axes, the best aid is the training of the fusion sense. The training, if instituted early enough, will frequently correct the essential and fundamental cause of the squint. The training of the fusion sense is best done by the physician, using a Worth-Black amblyoscope once or twice weekly for a period of eight to twelve weeks, and then less frequently. After the age of six it is seldom worth while to use this treatment, although, after many years of experience with the amblyoscope, I have seen some improvement in a few older children. In selected cases stereoscopic exercises are

done at home, as an adjunct to the amblyoscopic exercises.

Alternating convergent squint and occasional squint are treated the same as unilateral squint, except that there is no acquired amblyopia to be remedied. If neglected, however, either type may become a unilateral squint, and the deviating eye may become amblyopic.

When squint is present in patients after the age of seven or eight years and the defect is not corrected by the nonoperative methods, operation for cosmetic purposes must be instituted, as there is no other alternative. It is now that one of the most troublesome questions that arise in the practice of ophthalmology presents itself: At what age shall we operate and what surgical procedure shall we use? Opinions differ.

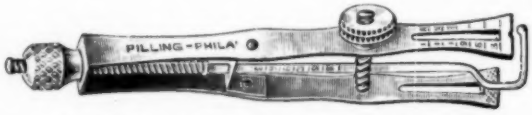

Fig. 2 (Smukler). The tucker is four inches long and three-eights inch wide. It has large fenestrations with graduations on its sides, allowing an easy view of the size of the tuck. A thumb screw above with quick-running thread on the muscle hook increases (or decreases) the size of the tuck to vigorously stretch the opposing muscle. The sides of the tucker are curved above and flat below, with slightly roughened inside surfaces that firmly grasp the tuck when the sides are brought together. The lower sides are brought together by a side screw with quick-running thread, which prevents the tuck from slipping sidewise while passing the needle below the tucker or during the time of the tuck. Base of tucker is of proper thickness and is flat, with slightly rounded edges, so that no injury to the tucked muscle will result when great tension is being made to stretch the opposing muscle. The base has a rounded indentation for a needle groove, which properly guides the needle. The needle groove is small enough to prevent the muscle from folding in it—a common annoyance when the needle groove is large when operating on young children. The muscle hook runs through a slit so that it will not move sideways. The horizontal part of the muscle hook that holds the top of the tuck is slightly roughened to prevent the tuck from slipping sideways, so that the needle will pass through the middle of the muscle. Drawing one-half actual size.

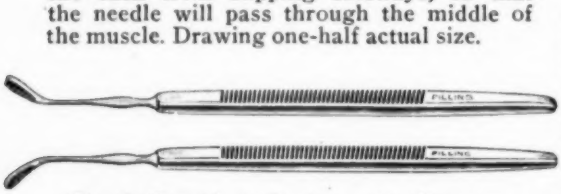

Fig. 3 (Smukler). Each curette (long, narrow and oval-shaped, with serrated edges) is angled from the lower part of the handle so that each one lies flat over the tendon from margin to margin on the inner and outer surface. Drawing one-half actual size.

Having performed many of the various classical squint operations in children of different ages, my observation is that the only satisfactory and safe operation for convergent squint is tucking of both external recti and vigorous stretching of the internal recti in all cases where the deviation exceeds fifteen degrees in children past the age of twelve or thirteen years.

The tucking operation and vigorous stretching of the opponent muscle is simple and effective, with very little postoperative disturbance. The tucking operation and vigorous stretching must be done on both external recti. The technique is greatly simplified and aided with a muscle tucker (figure 2) and two curettes (figure 3), which I have devised.

The tucking operation with vigorous stretching of the opponent muscle is the correct physiological and mechanical procedure, where the weakened external rectus with a stretched tendon is opposed by a muscle of increased strength—a condition so commonly found in these cases.

Vigorous stretching of the internal rectus is a very important factor in the success of the tucking operation. The stretching of the opposing muscle is accomplished by temporarily increasing the size of the tuck (figures 4, 5, 6, and 7) of the external rectus for three minutes, which apparently weakens or temporarily paralyzes the internal rectus by vigorously stretching it. Later the internal rectus returns to its normal physiological condition. This procedure prevents violent contraction of both recti muscles. These contractions might prevent the desired results. This procedure allows ample time for the folded portions of the tendon to become adherent and for the tuck to adhere to the body of the muscle upon which it lies.

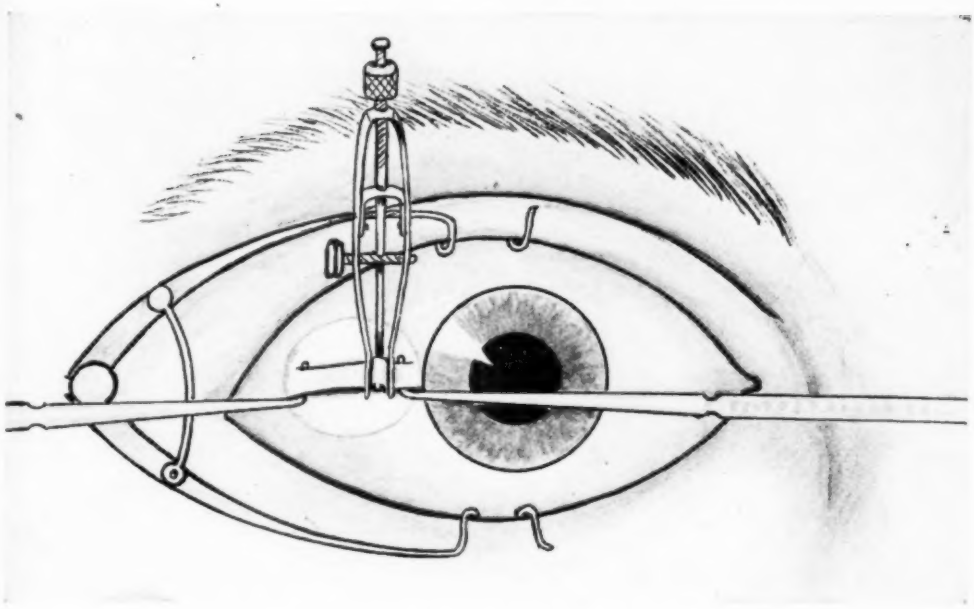

Fig. 4 (Smukler). Insertion of tucker.

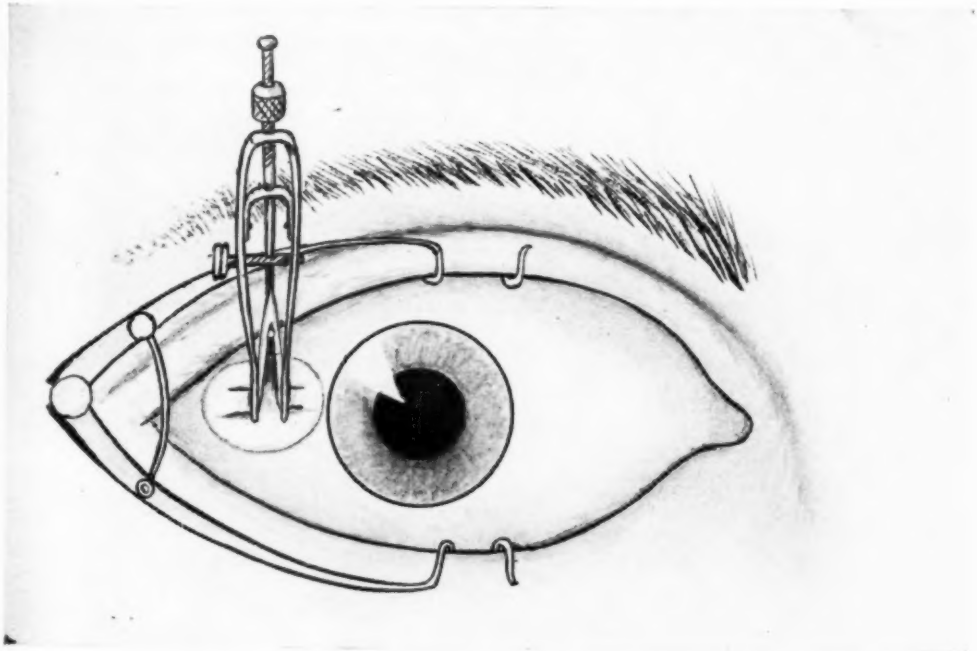

Fig. 5 (Smukler). Necessary amount of muscle tuck to evercome squint.

The effect of vigorous stretching of the internal rectus may be summed up briefly as follows: It (1) temporarily weakens the internal rectus; (2) prevents sudden contraction of the external and internal rectus muscles; (3) allows ample time for the tuck to become adherent; (4) causes the internal rectus to return to its normal physiological condition; and (5) makes easier the

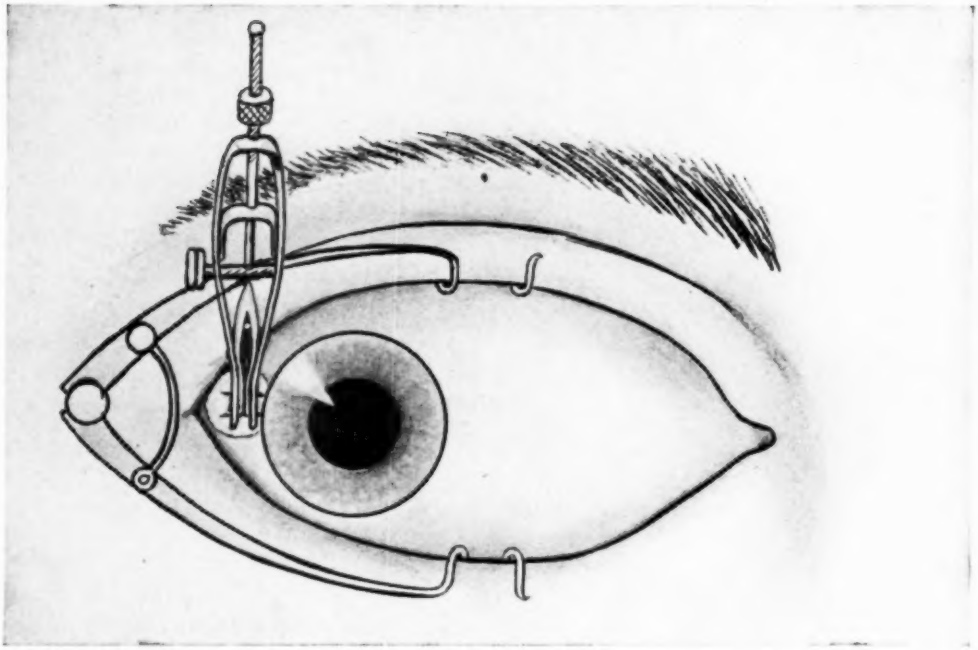

Fig. 6 (Smukler). Increased amount of muscle tuck causing vigorous stretching of the internal rectus muscle. The eye is held in this position of extreme abduction for three minutes, resulting in a temporary weakness of the internal rectus muscle.

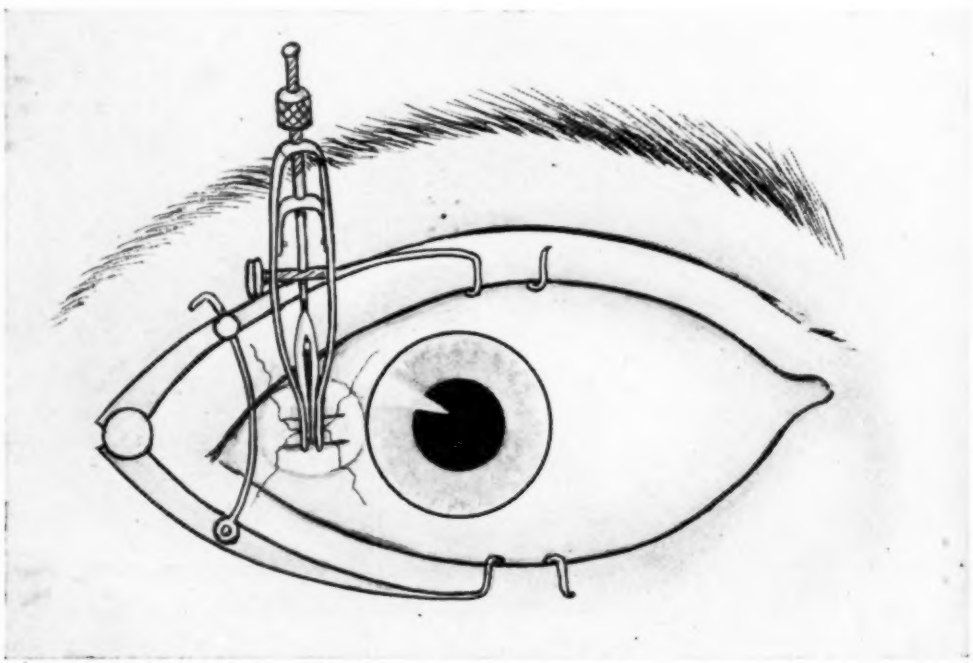

Fig. 7 (Smukler). After three minutes the tucker is released to the necessary amount of muscle tuck required to overcome the squint. The tuck is then tied.

passing of the needle below the tucker.

The effect of vigorous stretching of the internal rectus was deduced from an almost analogous treatment of cardiospasm of the stomach. One forced stretching of the hypertrophied muscle at the cardiac end of the stomach temporarily relaxes or weakens it, and then the hypertrophied muscle returns to its normal condition. Usually the cardiospasm does not return again even though there has been only a single treatment.

I believe that vigorous stretching is a better procedure than a partial tenotomy, for many of us have seen the results of a tenotomy nullified and the original condition frequently exaggerated by resulting adhesions around the site of the tenotomy.

I believe that failures in tucking operations are due to unsuitable instruments, poor technique, failure to tuck both external recti, and, most of all, failure to temporarily weaken the internal rectus muscle so as to allow the tuck to become adherent.

The time-honored, favorite, and frequently repeated objection to the tucking operation—namely, that it causes a bulging—is in my opinion not a serious one; the so-called bulge disappears in about two months and the contour over the site of the operation becomes perfectly normal. In fact, I am glad to see the bulge at first because it indicates that the tuck has become properly adherent.

In order that the nervousness of the patient and the pain may not jeopardize the results of the operation, I use general anesthesia, with the eyes completely atropinized. My technique for the tucking operation with vigorous overstretching is conveniently divided into four stages. The instruments used are fixation forceps; eye speculum; scissors; two strabismus hooks; special tucker; two special curettes; needleholder; half-curved, round-bodied edge, number 16 needle; and ethicon plain catgut, number 1.

Stage 1: An incision is made in the conjunctiva over the site of the tendon of the muscle to be tucked, 5 mm. from the limbus and parallel to it. Blunt-pointed scissors (the blades closed) are inserted into Tenon's capsule and then opened and withdrawn, thus exposing the tendon. The anterior flap of the conjunctiva is separated from the sclera in the same manner. No more cutting is done. A strabismus hook is then inserted and the tendon caught up; a second hook is passed under the tendon from the opposite side. Using these hooks the tendon is stripped from all its adhering tissues for about 14 mm. The tendon is next curetted clean over the entire outer and inner surface. The inner surface is scraped while raising the tendon with strabismus hooks. The scraping is very important, for if properly done the folded portions of the tendon become thoroughly adherent and the inherent tuck becomes adherent to the muscle on which it lies.

Stage 2: The tendon is now slightly raised and carefully inspected to see that it is properly curetted and stripped clean from the surrounding structures. The muscle hook of the tucker is slightly exposed below, and the sides of the tucker are placed slightly ajar; then the hook is inserted under the tendon about 5 mm. from the limbus. Then by rotating the upper thumb screw the hook is raised and a tuck results. The strabismus hooks are now removed and the tuck is gradually increased in size until a marked external deviation is present. This extreme external deviation is produced purposely, in order to weaken or temporarily paralyze the internal rectus by vigorous stretching. After three minutes of vigorous stretching, the tuck is gradually released until the desired correction is present (being sure that the muscle occupies the middle of the hook). The sides of the tucker are then brought together, so that the muscle tuck is firmly retained in its grasp. I always see that there is a moderate amount of divergence present at this stage, depending on the degree of squint the patient has; the amount one easily learns by experience.

Stage 3: The needle, threaded with fourteen inches of catgut, is inserted under the tucker in the needle groove from the corneal side. If care is taken

not to have the tucker too far from the limbus the needle slips out through the other side of the tucker very easily by merely tilting the tucker to the nasal side. If the tucker is inserted too far from the limbus it makes the passing of the needle below the tucker a very difficult procedure. I stress this point because to most beginners it is the most difficult part of the operation. Careful placing of the tucker and partial releasing of the muscle-tuck makes this procedure of passing the needle easy. The needle is now pulled through the other side and the catgut cut in half. After being sure that it is free from the sides and well under the tucker, it is tied with a double knot. The tying of the tuck is a very important procedure and if this is improperly done it spells failure. The tucked muscle is now released and the tucker removed. The tuck is easily examined by passing a strabismus hook through it; if one is sure that the tuck is properly tied the conjunctiva is brought together with silk sutures, atropin is instilled in the eyes, and both eyes are bandaged.

After treatment: I keep the patient in bed for ten days with both eyes bandaged. At the end of forty-eight hours the dressings are changed daily. After the tenth day the dressings are removed and dark glasses are worn. Both eyes are convergent for one month and then gradually become straight in two to eight weeks time. In about forty percent of the cases the patients complain of diplopia; this disappears in two to four weeks time.

Since adopting the tucking and vigorous stretching procedure on both eyes I have had uniformly splendid results in a large number of cases.

1940 North Broad street.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

BALTIMORE CITY MEDICAL SOCIETY

Section of Ophthalmology

January 22, 1931

Dr. Angus L. McLean presiding

Orbital abscess

Dr. Jonas S. Friedenwald presented the case of a young man with an orbital abscess due to frontal sinusitis. Seven months previously he had an attack of pain and swelling above his right eye following which the eye gradually became displaced forwards and downwards.

When first examined two months ago, there was a large fluctuant mass in the upper portion of the orbit and slight tenderness over the frontal sinus. In spite of negative findings on transillumination and x-ray examinations, the frontal sinus was opened, and a large amount of pus drained from the sinus and from an abscess cavity in the orbit which communicated with it. At the present time, five weeks after the operation, the condition was much improved but there still remained a large, inflammatory mass in the orbit. The point of interest was the compression of the eye-ball by this orbital mass. On examination of the fundus it was found that the upper and lower periphery could be seen with strong plus lenses, whereas minus lenses were required to see the extreme nasal and temporal periphery, and the whole retina showed minute horizontal folds. The patient complained of distortion of the image as seen with this eye, which he could correct by pressing on the sclera at the outer canthus. Leber had described cases of this kind occurring in orbital tumors, but believed that the similar pictures seen in orbital abscesses were due to detachment of the retina. There was no evidence to support this conclusion in the present case.

European clinics

Dr. Aaron Robinson gave a report of the work he had seen during his recent visit to foreign eye clinics. This was accompanied by lantern slide demonstrations.

The operation of choice for cataract extraction in the clinics he visited was the intracapsular method with forceps. The Smith or Barraquer operations were not seen. In Prague, Elsching's patients were brought to the operating room, in bed, operated on in bed and returned to their rooms in bed. In the Viennese and French clinics the patients walked to and from the operating room.

An eye speculum used by Lindner which would raise the lids from off the eye-ball was described.

Guist's modification of the usual cyclodialysis operation was described. Instead of closing the conjunctiva following the operation he raised an edge of the scleral wound and introduced into the channel a portion of lens capsule. So far the results of this operation had been excellent.

Dr. Robinson described in detail Dr. Gonin's method of localizing the retinal tear often found in cases of retinal detachment and his ignipuncture operation. Dr. Gonin, he said, emphasized the fact that the success of the operation necessarily depended upon the accurate localization of all tears. His statistics showed sixty percent cures up to 1930.

A method used by Lindner and Guist for localizing retinal tears was described. Roughly this consisted of a perimeter on which was a fixed electric light and a movable ophthalmoscope. The patient looked at the light and the ophthalmoscope was moved along the perimeter, the latter being moved to different meridians, until the tear was seen through it. Taking the meridian of the perimeter and the position of the

ophthalmoscope on it a formula and curve was developed which localized the tear.

Finally Dr. Robinson described two lacrymal sac operations, the modified Toti and the dacryo-cysto-rhinostomy of Dupuys-Dutemps, both of which he saw performed. Dupuys-Dutemps stated that his results with the latter operation were close to one hundred percent cures.

The modern association of syphilology and ophthalmology

Dr. Joseph Earl Moore presented a table showing the ophthalmologic diagnosis of 750 patients with eye disease, observed in the syphilis clinic of the Johns Hopkins Hospital. These patients represented the approximate incidence of syphilitic involvement of the eye in 10,000 syphilitic patients. The four main groups observed, of course, were the iritis and neuro-retinitis of early and relapsing secondary syphilis; the kerato-iritis of late syphilis; the interstitial keratitis of congenital syphilis; and the primary optic atrophies. Two cases were briefly reported, showing the occasional difficulty of diagnosis of early syphilis in the presence of marked inflammatory changes in the eye. This difficulty in diagnosis was based on the frequent insignificance of cutaneous and mucosal lesions of early syphilis. From the diagnostic standpoint, it was stressed that the blood Wassermann should be a routine part of the examination of all patients with inflammatory ocular conditions.

The remainder of the discussion was devoted to optic atrophy. Its pathology was briefly considered and it was pointed out that, in all probability, there could be no sharp distinction between optic atrophy due to tabes dorsalis and that due to so-called basilar meningitis. A review of the literature and the Johns Hopkins Hospital material disclosed the fact that all methods of treatment of primary optic atrophy, except two, were wholly unavailing. With routine antisyphilitic treatment, even including the arsphenamine products, the process progressed to blindness at about the same rate as if nothing were done. Two methods of treatment did seem to be of value in arresting the downhill progression of optic atrophy. These were fever therapy and sub-dural treatment by one or another modification of the Swift Ellis technique. On the basis of studies in the literature, fever therapy seemed to be less efficacious than sub-dural treatment. A number of case records were shown in the form of lantern slides to illustrate the fact that optic atrophy might be arrested and useful vision preserved over periods of time ranging from four to nine years by the use of sub-dural treatment.

Discussion. Dr. Harry Friedenwald wished to know Dr. Moore's opinion as to the occurrence of interstitial keratitis in cases of acquired syphilis, he himself being quite definitely of the opinion that such cases did occur. He also felt that some cases of optic atrophy of syphilis showed marked improvement after treatment with arsenicals.

Dr. Jonas Friedenwald stated that he had seen a number of cases of optic atrophy in luetics remain stationary under treatment. He had, however, been of the impression that those cases which were benefited by treatment, were, most often, instances of syphilitic basilar meningitis rather than true tabetic optic atrophy.

Dr. Moore in reply stated that interstitial keratitis did occur in cases of acquired syphilis.

Glaucoma simplex

Dr. Harry S. Gradle read a paper on this subject which will be published in the American Journal of Ophthalmology.

Discussion. Dr. C. A. Clapp said that for some time it had been thought that there was a definite difference in etiology between acute inflammatory and simple glaucoma. He wondered if the acute inflammatory type might not result from an acute exacerbation of an unrecognized simple chronic glaucoma. He doubted if children had simple glaucoma and believed these cases to be of the secondary type. He quite agreed with Dr. Gradle in his opinion of the frequent rise in tension during the night, having had one case in which

this was the only sign present. The question of just what was meant by normal tension must be considered, since cases were seen with a definitely elevated tension with no other sign and no symptoms. He felt that dispensary patients should be operated on as soon as a diagnosis of simple glaucoma was made, since these patients could not be depended on to carry out instructions as to home treatment. Private patients might be carried along satisfactorily without operation. He doubted if pilocarpin alone would control all cases that might be controlled medicinally, believing that eserine was essential in some. He mentioned a case in which pilocarpin produced mydriasis rather than myosis, both in a patient's eyes, and in his own eyes, and later in the eyes of animals. This was found to be due to a chemical alteration in the drug. A newer method of diagnosing glaucoma had not been mentioned by Dr. Gradle namely, that of drawing off the aqueous and measuring the subsequent rise in tension.

Dr. Harry Friedenwald thought that frequent fields must often be depended upon as a guide to the necessity of operation since the tension could not as a rule be taken as often as four times a day.

Dr. Gradle agreed with Dr. Clapp that early operation in dispensary patients was essential.

The draining of the anterior chamber as a diagnostic means was permissable from an experimental point of view but clinically it was not yet an advisable procedure.

He had known of cases in which the same prescription of pilocarpin caused dilatation of the pupils of one patient and contraction of another's. The idiosyncrasy of the patient was thought to explain this occurance. There were cases however in which an impure drug would cause mydriasis.

The essential determining factors of the necessity of operation were the visual acuity, the fields and the curve of tension. In an early case the curve of tension was the most important factor.

Henry F. Graff,
Secretary.

THE COLORADO OPHTHALMOLOGICAL SOCIETY

February 21, 1931

Dr. D. G. Monaghan presiding

Early choroidal tumor?

Dr. W. H. Crisp presented a woman of 45 years, who had complained of diminished vision in the right eye. The vision of this eye was about 5/12. On the temporal side of the macula was an approximately circular area of retinal detachment, its horizontal axis corresponding with the horizontal meridan of the eye, and measuring about five disc diameters in diameter. The detachment was elevated about seven or eight diopters, was very regular, without folds, and had shown little or no change in the course of two and a half weeks' observation. Using transillumination with a small lamp placed as deeply as possible at the outer canthus, and having the patient look moderately toward her left, while the examiner looked through the pupil without an ophthalmoscope, a rather well defined dense shadow was visible in the fundus at a point corresponding with the center of the area of detachment. The tension of the eye was normal and there was no other retinal change. It seemed probable that the case was one of early choroidal tumor.

Discussion. Dr. M. Marcove said that he had seen the patient six months ago at which time she gave a history of having had a positive scotoma for a year. He had noted a white area about 1.5 disc diameters in extent, with much the same appearance as now. The vision then was 2/70.

Dr. E. Jackson believed that frequent observation rather than enucleation would be the proper procedure.

Dr. Crisp added that the shadow could be the result of an optical condensation from the retinal elevation rather than to a tumor. He had advised the patient to be examined at intervals.

Dislocated lens

Dr. W. H. Crisp also presented a woman of sixty years, upon whose right eye an iridectomy had been per-

formed for the relief of acute glaucoma complicating a cataract of long standing. Cataract extraction had been done on the left eye with excellent result fourteen years previously. The right lens had been cataractous for several years and recently there had been a few acute glaucomatous attacks during which the patient was under the care of a general physician. On January 12, 1931, the cornea being steamy and the tension of the eye not yielding satisfactorily to the use of eserin, a posterior sclerotomy was done, followed immediately by an iridectomy under a conjunctival flap. The pillars of the iris coloboma were left in the scleral wound as a possible further safe-guard against renewed hypertension. There had been no suspicion of possible injury to the lens during introduction of the keratome. Upon withdrawal of the keratome the aqueous that gushed out was very milky. The patient had a number of bad teeth which it was not practicable to remove at that time, and the inflammatory reaction in the eye subsided rather slowly. When it was possible to make an entirely satisfactory examination, a week or so after the operation, it was found that the cataractous lens was dislocated downward to such an extent that about one-fourth of its diameter lay within the pupillary area. At the time of the report the corrected vision with a +13 D. sphere was 5/20. It seemed possible that the cataractuous lens had already been dislocated before the attacks of glaucoma, and then the milky aqueous suggested the possibility of fluid cortex from a Morgagnian cataract having escaped through a tiny rupture in the capsule. The tension was normal and the incarcerated iris tissue had served to develop a filtering cicatrix beneath the subconjunctival flap. Would it be proper to keep this eye under observation, postponing any attempt to remove the dislocated lens?

Discussion. Dr. G. Stine asked what percentage of cases with a lens sublaxated into the vitreous would develop glaucoma or iridocyclitis?

Dr. E. Jackson stated that in his opinion practically all such lenses eventually gave trouble. A slightly dislocated lens usually became progressively worse. He recommended trying to remove the lens with a wire spoon. In one of his cases he had made an incision, had pressed the lens against the cornea with the spoon, and had then delivered the lens by pressing on the eyeball.

Dr. E. R. Neeper said that he had had a case of posterior polar cataract in the left eye, probably inoperable, under observation since October, 1929. The vision was 1/20; prior to Dr. Patterson's death the eye had been treated by mercury injections and by dionin. The right lens had been floating in liquid vitreous since April 1928. In consultation it had been decided to do no surgery. There were three degenerated choroidal areas each one-third to one-half disc diameters in extent. The vision in the right eye with a +13.00 D. sphere was 20/40 and the patient was exceedingly happy and doing well visually. The right lens changed position freely in the lower vitreous according to the position of the head.

Dr. W. H. Crisp asked whether anyone had had any success in getting the lens into the anterior chamber by having the patient lie on his face and then holding the lens there by contracting the pupil?

Dr. W. M. Bane reported a case of long standing bilateral partial dislocation that he had first seen a year ago.

The patient came back six months later with an acute attack of glaucoma, the lens being in the anterior chamber. A posterior sclerotomy temporarily reduced the tension and one week later the lens was successfully removed. With correction the patient's eye was now doing well, the vision being much better than he had ever experienced before.

Embolus of retinal artery

Dr. W. T. Brinton presented Miss M. H., a nurse, aged 25 years. One week ago this patient had noticed on awakening that she had blurred vision in the right eye. She had a history of a mild attack of influenza a few days be-

fore. She had had no headaches. Her teeth were good and her tonsils were out. There were no valvular heart lesions. A Wassermann test had not yet been done.

Examination showed an area of pallor or edema most marked just below and external to the macula and fading off into normal tissue, but extending farthest toward the temporal side. The macula was cherry red. There was some edematous elevation of the retina. There was a corresponding field defect. The diagnosis was embolus of the inferior branch of the central retinal artery.

Discussion. Dr. Edward Jackson said that the first case of embolus of the central artery of the retina reported (by Graefe) was probably genuine. Dr. Jackson believed, however, that most cases diagnosed as embolus were really thrombotic in nature. He suggested the possibility of retrobulbar neuritis which would give such a scotoma. He thought there might be a limited lesion in the optic nerve. The case might also be one of Jensen's chorioretinitis, which would show partial atrophy and pigmentation a year from now. Dr. Jackson said that one should also bear in mind the history of influenza, for he had seen several cases of venous thrombosis following this disease. One should also consider the possibility of hemorrhage in the optic nerve. Dr. Jackson said that the cherry red spot did not seem characteristic to him.

Dr. W. H. Crisp said that it was his understanding that inflammation would occur only in the interstitial tissue and not in the nerve itself. Therefore, he was not in favor of a diagnosis of retrobulbar neuritis. He suggested that there might be a blocking of a cilio-retinal artery. He also believed that one might have an early tuberculous disturbance in the superficial layers of the choroid. It was his opinion that the appearance of the area was due to elevation rather than ischemia.

Detached retina, atrophy of the globe

Dr. R. W. Danielson again presented the boy shown at the November meeting, the patient at that time had an anterior chamber full of blood from a double penetrating wound made by a small shot. The blood had absorbed, but the retina had become detached and was lying next to the lens. The lens was slightly dislocated so that it was pushing the lower temporal part of the iris forward against the cornea. The iris was discolored and there were several white degenerated areas where it came in contact with the lens. For a month the eye had been very red, but no cells were found in the anterior chamber of either eye. The vision of the good eye was 5/4 and of the poor eye, light perception only. The tension of the eye was very low. Should the eye be removed?

Discussion. Dr. E. Jackson thought the eye should be removed if the injection continued.

Dr. E. R. Neeper wondered whether it was not the vitreous instead of the lens pushing the iris forward, because there was no opacity.

Dr. Danielson said that he believed that the lens had not been injured and therefore was still clear.

Congenital posterior polar cataract

Dr. W. N. Bane presented M. C., a boy of eight years who had been found by the school nurse to have defective vision. Examination revealed blepharitis. Vision O.D. was 5/10, vision O.S. 5/10—2. The fields were normal; the pupils were equal and reacted to light and accommodation. When the pupils were dilated, a faint central opacity of each lens was noted. There was very little improvement from lenses which raised vision to 5/7.5 right eye, 5/7.5 left eye; glasses were not ordered.

The father was also presented because he had similar opacities in both lenses.

Discussion. Dr. E. Jackson believed that the opacities were located near the posterior pole because the corneal reflex from a light at any position stayed in line with the opacity. He thought that he found a Mittendorf dot in the father but no other evidence of fetal remains. He believed the condition was hereditary and congenital.

DR. W. H. CRISP also pointed out that the center of curvature of the cornea is just in front of the posterior capsule of the lens, so that by the principle of parallax one could determine the location of the opacity.

DR. M. MARCOVE suggested that there might be a posterior lenticonus, which could be determined with a slit-lamp.

DR. E. JACKSON replied that he believed no posterior lenticonus present because he had noticed that there was no apparent deformity of the contour of the blood vessels of the retina as one moved from side to side.

Parathyroid cataract

DR. M. E. MARCOVE showed a case of parathyroid cataract which followed operative treatment for an exophthalmic goiter. The case will be reported in full in an early edition of the American Journal of Ophthalmology.

Acute glaucoma from homatropine for cycloplegia

DR. G. H. STINE and DR. V. H. BROBECK reported a case of J. D., aged 33 years. This patient complained of asthenopic symptoms following close work. The eyes were normal except for slightly shallow anterior chambers. Two days after homatropine cycloplegia the corneae were steamy, the eyes injected and painful. The tension was 66 mm. and 60 mm. in the right and left eyes respectively. Intensive treatment with pilocarpine and eserine brought the tension down to 9 mm. and 11 mm. by afternoon with relief from pain.

The diagnosis was acute congestive glaucoma precipitated by homatropine cycloplegia. There was nothing in the previous history to indicate the presence of glaucoma, although, in retrospect, the objective findings in the preliminary examination were suggestive of glaucoma. The patient had an advanced pulmonary tuberculosis but had been able to be up and to do some light work.

DONALD H. O'ROURKE,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

February 16, 1931

DR. HARRY S. GRADLE presiding

Posterior lenticonus

DR. LOUIS BOTHMAN presented a man 40 years of age who had come to Billings Memorial Hospital with a complaint of headache. He stated that he had had poor vision in the right eye all his life and no lens improved this vision. The sight in the left eye with +5.00 D. sphere was 20/15. The pupils were very small. Before dilatation there was an impression of posterior polar cataract in the right eye. In 1926, Reese of New York, in the Transactions of the American Ophthalmological Society, described a case and concluded that only six of the cases on record could really be called posterior lenticonus. The following year, Marsh of Patterson, N.J., reported a case in the Archives of Ophthalmology. In April, 1930, in the same magazine, Harrison-Butler described five cases, in one of which the condition was present in both eyes. Altogether there were fourteen cases on record.

When Vogt reported the first case seen with the slit-lamp he described a cherry red ring seen when the beam of the slit-lamp was thrown on the lens. That was not present in this case. None of the cases reported showed opacities in all the 360 meridians of the lens reaching the equator, as was found in this case. None described true cataractous changes in the lens or a conus in the embryonal nucleus. In this case brown punctate opacities began just behind the embryonal nucleus and went back as far as could be seen with the slit-lamp. The conus began at the posterior surface of the embryonal nucleus. It has been said that the condition could not occur prior to formation of the fetal nucleus. It must occur in late fetal life or early extrauterine life. This case showed changes in the embryonal nucleus, therefore the lesion could develop at an earlier date than was previously believed.

Neuroretinitis papulosa

DR. ELIAS SELINGER showed a well-developed colored man, 27 years of age, whose near and distant vision began to fail suddenly and painlessly a year ago and had gradually become worse. Vision O.D. was 20/15, O.S. 16/200. The right eye was normal. The pupils showed no pathology. The left disc had a waxy orange pallor and was indistinct, apparently due to fine vitreous opacities. There were no formed floaters. The retinal vessels were markedly narrowed. A grayish white fold of new tissue, two to several times the width of a primary retinal vessel, was seen to extend vertically across the disc and temporalward from the temporal disc margin near the upper pole to a large bluish gray elevated retinal lesion, two to three p.d. in diameter which was irregular in outline, situated about three to four p.d. above the macular area. This lesion contained some new vessels. From this point the fold of new tissue continued, curving broadly downward and equatorially. New formed vessels were seen in its temporal extension in places. The intraocular tension was normal.

Central retinal vein thrombosis

DR. ELIAS SELINGER showed a well-developed white male, 41 years of age, who had had a gradual loss of vision in the right eye two months ago. At present he could count fingers at two feet. There was some polypoid degeneration of the right middle turbinate and polypi in the right middle nasal meatus. Ophthalmoscopically there were the typical changes of a central vein thrombosis. The physiological excavation of the disc was sharply outlined, almost punched out, and was three diopters deep. Tension with Schiøtz tonometer was 6.

Intraocular hemorrhage

DR. G. W. NETHERCUT presented a woman 25 years of age who complained of disturbance of vision in the right eye six months ago; pain had been present at intervals for four months. About one month ago she came to the clinic where tension was found to be 55 mm. The fundus was filled with brownish-red material, probably blood; the anterior chamber was deep. The slit-lamp picture showed an increase in the albumin content of the aqueous. Vision at this time was light perception only. Transillumination was negative. General physical examination revealed two findings of significance; a 4+ Wassermann and infected tonsils. During the past month while she had been under treatmen she had had no pain. Probably the pain was due to the sudden rise in the tension at the time the hemorrhages occurred. There had been some absorption of the hemorrhage, for with oblique illumination an irregular anterior limit could be noted. The hemorrhage seemed to be attached to the nasal portion of the retina. There was no red reflex.

Discussion. DR. GEORGE F. SUKER asked whether Dr. Nethercut suspected this to be of syphilitic origin. It was exceptionally rare for an individual of this age to have a syphilitic thrombosis. The only condition that would produce such a hemorrhage was syphilitic endarteritis and then it would also be very liable to produce a similar fundus change in the other eye. She had no known cardiac symptoms but undoubtedly had a mediastinal tuberculous lesion. It was not uncommon in young individuals to have a massive hemorrhage into the vitreous due to tuberculosis of the retinal veins or arteries, particularly the arteries, while it was not a characteristic of lues to cause hemorrhages in the fundus at so early an age. Between the ages of 20 and 30 marked vitreous hemorrhages were rather characteristic of tuberculosis, and frequently glaucoma symptoms appeared, which disappeared upon the recession of the hemorrhages. Such hemorrhages were prone to recur at intervals, involving either one or the other eye—quite frequently alternating. This case was suggestive of tuberculosis of the retinal vessels.

Congenital malposition of puncta

DR. O. B. NUGENT presented a girl 17 years of age, who had had excessive tearing of the left eye all her life. This had become worse during the past few

months. Upon examination it was seen that the puncta and especially those in the lower lids were not on the papillae, but practically in the middle of the edges of the eyelids, about 2 mm. from the papillae to the nasal side, so that tears could not flow through. Examination showed each punctum of the lower lids to be irregular with indistinct nasal border. The rounded border of the punctum was not complete, probably due to lack of development. The upper punctum in each lid was only about .5 mm. away from the papilla lacrimalis. In the literature supernumerary puncta were described, sometimes as many as four on one lid, but nothing was said about there being no punctum on the papilla as in this case.

Mauchk's operation for glaucoma

DR. GEORGE F. SUKER presented a woman who was operated on after this method about six months ago for subacute glaucoma with an acute attack superimposed. The eye was saved but she had a perimacular lesion and vision was not good. Tension was over 60 mm. at the time of operation and was now 20 to 21 mm. which was as good a result as could be obtained by any other operation.

Traumatic paralysis of the left superior oblique

DR. GEORGE F. SUKER showed a man who had a traumatic paralysis of the left superior oblique muscle with oblique diplopia. After several weeks' observation it was decided to operate. The conjunctiva was dissected back from five to nine o'clock and both external and inferior rectus muscles laid bare. The external rectus was split in half, including a portion of its lower tendon insertion. The same was done to the inferior rectus, including the temporal portion of the tendon insertion. Then the sclera was nicked for about 4 mm. just between the insertion of the external and inferior recti muscles, a trifle in advance of the insertion of these two muscles. Next the lower half of the external rectus was sutured to the sclera at the point mentioned. Then the temporal portion of the inferior rectus was sutured close to the new insertion of the external rectus. Fine catgut sutures were used. The conjunctiva was closed by several fine silk sutures. The new insertion of the two halves of the muscles was about a millimeter or so in advance of the original insertion and at a point midway between them.

The result had been functionally very good; the patient had binocular fixation and stereoscopic vision and no diplopia. A similar operation had been performed several times by Aurant of Paris.

Lesions of eyelids and face

DR. CLARK FINNERUD (by invitation) showed and described a large series of slides, depicting various skin lesions of the face and eyelids. These were discussed by Dr. Francis Senear.

Oculoglandular tularemia

DR. GEORGIANA THEOBALD presented a paper on this subject which will be published in full in the American Journal of Ophthalmology.

Discussion. DR. CLARK FINNERUD said that he had failed to recognize a case of tularemia in a young colored male seen only once several years ago. There had been a history of cleaning rabbits and an adenopathy was present. Now the disease was well known and was accurately diagnosed by the specific serologic reaction.

Types of non-gonorrheal conjunctivitis in the new-born (Entrance thesis)

DR. N. K. LAZAR presented a paper on this subject.

ROBERT VON DER HEYDT,
Secretary.

ST. LOUIS OPHTHALMIC SOCIETY

January 23, 1931

DR. M. H. POST presiding

Monocular cycloplegia in the treatment of myopia

DR. WM. H. LUEDDE read a paper which will be published later in the American Journal of Ophthalmology.

Discussion. Dr. Wm. F. Hardy asked if students had difficulty with their work due to monocular cycloplegia; also what percentage of eyes showed stopping or recession of myopia; and how long the cycloplegia was maintained. He also inquired as to the effect on esophoria.

Dr. J. Ellis Jennings mentioned the difficulty of knowing which cases required such treatment as described. Watchmakers were not considered good examples as their work was begun after the eyeball was hard enough to resist the effect of convergence. Myopia usually ceased to increase by the end of school age. A case was cited with myopia of —6.0 D.S. at the age of four years which through college had shown no increased myopia though no treatment had been given except proper lenses.

Dr. Tooker suggested that the increase noted in Dr. Luedde's cases might have been due to ciliary spasm.

Dr. Luedde, closing, said that confusion caused by eliminating binocular fixation in students varied but usually did not interfere more than a day or two. Recessions in myopia were noted in six or eight cases. The period of treatment varied from weeks to months, first one eye and then the other being treated. No marked increase in exophoria for distance was noted but that should be watched, though muscle balance for distance might not be disturbed. Using a magnifying loupe over one eye might retard development of myopia but benefit of rest for the eye by atropin was lost. There seemed to be a difference between mere convergence and convergence with binocular fixation as in the latter there was probably pressure at the equator with tendency to produce axial elongation. Convergence took place but binocular fixation for near was broken up by monocular cycloplegia. It was in those cases that this treatment seemed beneficial. Ciliary spasm was eliminated as a factor, in results quoted, by alternating cyclopegia from eye to eye. The binocular recession or control of the manifest myopia also argued against ciliary spasm. A case of myopia had been seen in a watchmaker but statistics showed a lowered incidence in watchmakers as a class.

B. Y. Alvis,
Editor.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section of Ophthalmology

February 13, 1931

Dr. John Brown presiding

Ocular pemphigus

Dr. Erling W. Hansen presented a patient aged sixty-six years with ocular pemphigus that began thirty years previously. Symblepharon of both eyes was present. There was some question of the diagnosis between old trachoma and pemphigus. There was no history of skin nor mucous membrane involvement.

Dr. Hansen said that this disease was variable in its clinical manifestations as to the site of the lesions and the mortality. Ocular pemphigus usually began in the conjunctiva, starting as greyish patches and not true bleb formation. The surface of the patches soon became shredded and was cast off. The condition might last for years and usually ended by shrinking of the conjunctiva.

The pathology was a fluid infiltration, not cellular, and shredding of the surface. The disease occurred at all ages.

Discussion. Dr. W. W. Lewis had seen the case before and did not believe it to be pemphigus because of the lack of other mucous membrane or skin involvement and lack of bleb formation. He said that trachoma led to symblepharon.

A recent case was first diagnosed by the dermatologists as erythema multiforme. Pemphigus blebs developed and included the conjunctiva. The patient died in about four weeks. Another case had died within three weeks.

Dr. Hansen said that the diagnosis in this case was probably pemphigus but he knew of no proof. There were many cases reported by students of this dis-

ease, without mucous membrane involvement. The patchy condition found in the lower lid which looked much as though there had been discrete plaques and because both outer canthi were thinned and adherent led him to suspect pemphigus.

Congenital cataract

DR. HANSEN also presented a case of bilateral congenital cataracts in a man forty years old and said he thought it would be interesting to take a vote of the members on whether or not it would be wise to operate on this man. He had 20/100 vision in each eye without any glasses. Sight could be improved slightly with a rather high correction for compound myopic astigmatism. (The members present voted unanimously against operation in this case.)

Sarcoma of the choroid

DR. F. FELLOWS (Minneapolis) (by invitation) reported the case of a woman forty-five years of age, who first noticed a dull aching pain in the occiput about February, 1930. This was worse in the morning or during the day when she would get up after lying down for a time. This pain was associated with an occasional throbbing pain in the temporal region on the right side and sometimes an aching sensation in the whole eyeball following reading or sewing. About April first she noticed that newspaper lines appeared to slant downward from left to right. About the middle of April she noticed, when looking straight ahead, that objects below the horizontal disappeared. Her vision had gradually become worse and since August she had been unable to read. Vision in that eye now was limited to light perception and peripheral movements. Fundus examination showed a round elevated mass, bluish-gray in color, in the macular region, about one-third disc diameter in size and surrounded, when first seen, by a slight halo of hyperemia. There was no exudate present and no signs of other pathology. The diagnosis lay between a tubercle and a sarcoma.

Discussion. DR. F. E. BURCH (St. Paul) stated that the fundus camera and the work which Dr. Fellows was doing with it at the Eye Clinic of the University was especially valuable in providing permanent record of fundus pathology. In cases like one of those shown, which was presumably a beginning sarcoma and, if so, probably as small a sarcoma as one ever saw, it was impossible to make positive diagnosis without further observation. The patient was returning for another photograph, about sixty days after this photograph was made. By taking later photographs and enlarging them as this one was, exact measurements of growth could be made from time to time until the diagnosis was certain. The record was of value from that standpoint alone.

Tuberculous choroiditis

DR. F. FELLOWS presented the case of a white male, twenty-four years of age, whose left eye was removed in February, 1929, a few days following injury. In July he was seen by an oculist to whom he was sent with a presumptive diagnosis of sympathetic ophthalmia of the right eye. However, the oculist found considerable ciliary injection, a cloudy vitreous, and loss of pigmentation throughout the retina with numerous choroidal spots on the nasal retina. Reaction to tuberculin was strongly positive. X-rays of the chest were negative.

Upon his admission to the University Hospital, December 31, 1930, the vision was 20/20. The fundus showed many fine vitreous opacities. There was a fine membrane present in the vitreous to the temporal side of the disc and apparently fixed in position, the free edge floating about with movement of the eye. The retina showed a moderate amount of edema and on the nasal side there were about six spots of choroiditis with one large and a smaller white raised area giving the appearance of tubercles. A diagnosis of solitary tubercles with tuberculous choroiditis was made.

Discussion. DR. F. E. BURCH called attention to the striking contrast between the picture of the beginning sarcoma

and the other one which was undoubtedly a tubercle. In looking at the two pictures one could see some haziness in the vitreous anterior to the tubercle but none anterior to the sarcoma. The pigment change and the outlying pathology with the tubercle were lacking in the sarcoma case. The latter seemed to have a halo around the growth as if retinal detachment were imminent. These two cases could almost be diagnosed clinically from the fundus photographs alone. The stereo-photographs would be even more helpful. Dr. Burch felt that the camera was a very promising addition to our armamentarium, both for diagnosis and for case records.

Jawblinking phenomenon

Dr. H. W. Grant (St. Paul) showed moving pictures of a case of this condition.

Discussion. Dr. E. S. Strout (Minneapolis) stated he was very much interested in Dr. Grant's paper and case report, as he had had a similar case five years ago. This was in a girl ten years of age, with a congenital ptosis involving the left eye. She was able to raise the lid only by opening her mouth widely and protruding the tongue to the left side.

A Reese operation for the correction of the ptosis was performed and quite a satisfactory result obtained. The patient had not been seen for several years so her present status was unknown.

Walter Camp,
Recorder.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section of Ophthalmology

January 9, 1931

Dr. John Brown presiding

Test for latent muscular imbalance

Dr. Walter H. Fink (Minneapolis) read a paper on this subject.

Discussion. Dr. Paul Berrisford (St. Paul) said that no phase of his practice gave him more trouble therapeutically than moderate degrees of exophoria. So common was the existence of a small degree of exophoria for near, and so rarely was it accompanied by symptoms, that it might be considered to be within physiological limits. High degrees of exophoria, paradoxical though it might at first seem, seldom gave rise to symptoms. This was due, he felt, to the fact that, no sooner was near work begun than the exophoria became an exotropia. This was made evident by the fact that a symptom-producing exophoria would be relieved from discomfort if one eye was bandaged.

Heterophoria was an over or under action of certain muscle coordinates. Such a deranged action of the extraocular musculature could only be measured in dynamic units. Therefore a heterophoria must logically be measured with the eyes in action.

When one eye was bandaged for a prolonged period as in the occlusion test, the heterophoria that existed in that patient under ordinary circumstances was disturbed and an artificial condition produced. The coordination that existed between accommodation and convergence was largely ignored.

That the prolonged covering of one eye would in time fully uncover the "latent" heterophoria was untrue. While accommodation was permitted to exist the adjustment between accommodation and convergence would exert its influence on the covered eye. Only through the prolonged covering of both eyes might the "latent" heterophoria become fully manifest.

In conclusion he said the occlusion test for estimating heterophoria was illogical for it was an attempt to estimate the dynamic power of the extraocular musculature by static standards.

Dr. W. E. Camp (Minneapolis) felt that the occlusion test might be of value in certain unusual cases of unexplained asthenopia, and believed that it would be of more value in the cases of vertical deviation than those of lateral deviation. Appleman, in his paper in the January, 1931, number of the American Journal of Ophthalmology gave an analysis of 500 cases tested by his method which practically amounted to fogging the patient with prisms. Dr. Camp did not believe that this method

would be as accurate as the occlusion test described by O'Conner and Marlowe. It would seem that the shorter periods of occlusion should be as satisfactory for the test as the longer periods. The ideal occlusion, Dr. Camp believed, would be one of both eyes; if the test could be made after the patient had been asleep for two or three hours. This would preclude not only any attempt at fusion, but also any attempt at fixation. The muscular tonus and nerve stimulus would be at a minimum.

Dr. F. N. Knapp (Duluth) asked Dr. Berrisford how he could consider exophoria and divergence insufficiency with asthenopic physiology. He had been interested in Marlowe's work because of symptoms of asthenopia that were not relieved by correction of refractive error. Sometimes prisms were prescribed for the correction of exophoria. On re-examination of the patient with the correction, the degree of exophoria was as much as on a previous examination without correction. A more accurate measurement of the exophoria might be obtained in this type of case by covering one eye for several days.

Patients suffering from asthenopia due to exophoria were often relieved of their symptoms by covering one eye for from two to five days. The occlusion test would demonstrate to the physician as well as to the patient that the symptoms were caused by muscular imbalance.

Dr. J. F. Fulton (St. Paul) said that he did not often use occlusion as a diagnostic measure believing that careful and repeated testing by prisms brought about satisfactory results. An artificial heterophoria might be brought about by prolonged occlusion. He did resort to occlusion in distressing cases of asthenopia, and by so doing gave courage and hope to the patients and impressed upon their minds that the symptoms they complained of were due to the maintenance of binocular vision in the presence of heterophoria.

Dr. H. W. Grant (St. Paul) recalled the case of a professor at the University, who, while chopping a piece of wood, was struck in the right eye abrading the greater portion of the cornea. This healed without scar in about ten days but, after removal of the pad, the patient nearly collided with two or three cars while trying to drive. On returning to the office the same day it was found that he had ten degrees of hyperphoria, which finally adjusted itself to one degree after several days. Occasionally, when this eye was occluded, the hyperphoria would return. One peculiar thing about this patient was that he was without asthenopia. In prescribing he was given one degree of prism for the hyperphoria which was manifest. Dr. Grant doubted if it would have been possible to give this man a full correction for the vertical deviation for he doubted if the patient would have accepted it. He had seen many patients with a high degree of hyperphoria wearing only partial correction and yet entirely comfortable. Several patients were wearing ten degree prisms and had three or four degrees of uncorrected error without asthenopia.

Dr. Walter H. Fink, in closing, stated that in collecting a series of perfectly normal cases occluded for ten days, refracted with cycloplegia, and reexamined, he found high degrees of hyperphoria. Many oculists might confuse these physiological conditions and prescribe prisms for cases when they were not needed.

He had difficulty in getting patients to have the eye covered for a week. He suggested correcting the hyperphoria by the use of prisms. Most men agreed that the lateral muscle imbalance might be disregarded.

Walter M. Camp,
Recorder.

ST. LOUIS OPHTHALMIC SOCIETY

February 27, 1931

Dr. M. H. Post presiding

Evaluation of pseudoisochromatic tests for color blindness

Dr. J. Ellis Jennings read a paper on this subject which will be published

in the American Journal of Ophthalmology.

Discussion. Dr. M. L. Greene had used Stilling's test in some 1,500 cases and found it confusing and of value only when checked by Jennings' self recording or Holmgren's test.

Dr. J. H. Gross has used the Adler colored pencils as a test satisfactorily. He made marks of red, green, blue, etc., on a blank card and asked the patient to make marks of the same color alongside, having first tried out the pencils on a different paper to find the right color. Error in naming colors was thus avoided and the card was filed for record.

Dr. Harvey J. Howard had found the Jennings' self recording test most satisfactory. He did not find any defect in color sense not elicited by it, following hesitant decisions with a request to name color and shade of yarn displayed. He believed color testing a test of intelligence of the examiner.

Dr. Wiener thought Dr. Jennings' objection to the Ishihara test could be overcome by making control plates on each of which the color blind might see the same figure but the normal eye a different one.

Dr. Jennings, closing, emphasized the need of having more than one test. The study was made to find the best of the isochromatic tests. The patients were cautious and careful and often confused through fear of losing their jobs. He concluded that Stilling's test was best and with lantern and worsteds should suffice to detect color blindness. He believed a color blind person could be taught to read Ishihara's test as the number he saw was a clew to the number seen by the normal color sense. No control plates existed but might be made.

Annular scleritis with report of a case

Dr. C. W. Tooker read a paper on this subject which will be published in the American Journal of Ophthalmology.

Discussion. Dr. Harvey J. Howard had seen the case and observed a resemblance to plasmoma of the conjunctiva due to color of the elevated area; possibly the fact that the predominant cell in brawny scleritis was the plasma cell might warrant one so mistaking it. He believed the injection of atropin might have stirred up a latent infection in the ciliary body causing it to spread to the sclera.

Divergence paralysis

Dr. Harvey J. Howard presented the case of a patient who had this condition, published in this number of the Journal, p. 736.

Discussion. Dr. F. E. Woodruff asked whether the internal and external recti had been tested separately by prisms and whether decentration of the glasses worn might have increased the esophoria.

Dr. C. W. Tooker had had a similar case; a woman aged fifty years, who had a homonymous diplopia beyond one meter but normal binocular vision within one meter. No pathological condition was found and no cause for her divergence insufficiency which was of sudden onset and continued for many years. He felt that Dr. Howard's case was one of divergence insufficiency.

Dr. Howard, in closing, stated that "divergence insufficiency" was not an etiological diagnosis but might refer to several defects. The significant data in the case reported were, sudden persistent diplopia; history of carcinoma with intracranial metastases; eye movements unrestricted and coordinated in the six cardinal directions; twenty degrees of esotropia for distance with diplopia which disappeared at one meter; this being sufficient for diagnosis of paralysis of divergence. Tests showed at least twenty diopters of convergence power. The glasses were properly fitted and worn. Although presence of the divergence center had not been proved he believed this case was brought about by metastasis to such a center.

B. Y. Alvis,
Editor.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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ATTENTION TO DETAILS

"Trifles make perfection and perfection is no trifle", was observed by Michael Angelo. It needs to be always remembered and acted upon. How often we omit something important we do not know, but we do notice and criticize such omission, in any one else.

A doctor traveling across the country, noticed irritation and redness of one eye. In cities that he passed through he stopped and consulted three doctors, who practiced ophthalmology as their specialty. Not being relieved he went, in a Pacific Coast city, to a fourth oculist, and was at once relieved by removal of a foreign body from the conjunctiva of the upper lid. Then he stated that not one of the other three oculists had everted his lid.

Another detail, easily neglected, is use of the best lights for examining the cornea for a foreign body, or a corneal abrasion. Different cases require differences of lighting; and one case may need to be examined in two or three ways; before it can be said that a complete examination has been made. For a possible injury of the corneal surface placing the patient before a broad window, and examining the reflection from its surface, may be all that is needed. But in other cases oblique illumination, with light concentrated on the cornea may be essential, or the ophthalmoscopic mirror may be necessary.

An oculist, looking for a foreign body on the cornea, with the broad light, found none. A few hours later the patient returned complaining. Then a cocain solution gave relief; but two hours after that the annoyance was worse than ever, and the pericorneal zone was getting red on the temporal side. Oblique illumination in the dark room, and use of the magnifier, showed a small grain of sand embedded near the hyperemic zone. Its removal gave complete relief. In another case the foreign body was not found, by either broad light, or oblique illumination. But the ophthalmoscope, with the + 16.D. lens behind the sight hole, showed it instantly. It was a bit of coal dust, and the patient had a dark iris. Against the red fundus reflex, it could not be overlooked.

A man approaching forty, had per-

sistent irritation in his eye, and consulted an oculist for it. There was no foreign body present, and no pathogenic bacteria in the slight discharge. But he had a moderate hyperopic astigmatism. This was carefully corrected; and the glasses were worn two weeks without any relief from the irritation. He spoke about it to his next door neighbor, who was a jeweler, and who looked at the eye through a watchmaker's glass, and saw a single minute incurving lash, that rubbed the eyeball. This was pulled out, with the forceps used in handling fine nuts and screws, and there was no more irritation. The patient told the oculist about it, and continued to wear his glasses. Destruction of the root of the lash made the cure permanent.

The trifle that makes perfection is always needed. The comfort and safety of the patient depend on it; and the reputation of his professional advisor depends on it also. *Edward Jackson.*

THE PHILADELPHIA MEETINGS

After an interval of thirty-four years the American Medical Association again met in Philadelphia, with a registered attendance of about 7,000 of its Fellows. On Monday the 7th, the American Board for Ophthalmic Examinations held its annual meetings and examination for applicants. Tuesday morning and afternoon the Association for Research in Ophthalmology held its second annual meeting. The two sessions devoted to the Etiology of Chronic Uveitis were held in the Weir Mitchell Hall, the largest meeting room of the Philadelphia College of Physicians. The attendance was notably larger than at the first meeting a year before; and Dr. George E. de Schweinitz, a former President of the College, in opening the first session, made a striking allusion to the work Mitchell did in calling the attention of ophthalmologists and neurologists to the effects of eyestrain.

The series of papers read at the meeting will appear in this Journal. They discuss some of the conditions likely to cause chronic uveitis: Infection of the upper respiratory tract, a paper by J. E. Mackenty, of New York; Elective localization, by Rosenow and Nickel of the Mayo Clinic; Experimental production, A. L. Brown, of Cincinnati; Tuberculosis, W. C. Finnoff, Denver; Endogenous infections, E. E. Irons, of Chicago; and Syphilis, by Paul A. O. Leary of the Mayo Clinic. This list indicates what a wide field there is for study of the Etiology of Uveitis; and the review of its literature shows how little has been established with regard to it.

The titles of the eighteen papers that were presented to the Section on Ophthalmology are already accessible in the program of the meeting, and in the Presession volume of 350 pages they have been made accessible in full, to a majority of readers of the American Journal of Ophthalmology. Most of them deal with subjects that are new, previously little noticed in society proceedings, or discussed from an unusual point of view. This made the meeting one of live interest and novel suggestions, which cannot be transmitted by any brief abstract. The reports of committees were brief, and assurances of continued interest and valuable future prospects. But those on the Committee of pathology, the Knapp Testimonial, and on Ophthalmic Examinations, record real achievements. The certificate of the Ophthalmic Board had been granted to 851 persons, up to the beginning of the year; and provision had been made this year for three examinations, at Philadelphia, Denver, and French Lick Springs. These certificates are becoming more important; as they are required for admission to ophthalmological societies, staff appointments to hospitals, and recognition of general fitness for ophthalmic practice, and expert examinations in various services.

The officers for the Section chosen for the coming year are: Chairman, Harry Friedenwald, Baltimore; Vice Chairman, William H. Luedde, St. Louis; Secretary, Parker Heath, Detroit; Member of House of Delegates, Edward Stieren, Pittsburg; Alternate, William H. Crisp, Denver; Member of American Board of Ophthalmic Ex-

aminations, Walter B. Lancaster, Boston; Committee on Optics and Visual Physiology, Edward Jackson, Denver.

For the coming year the House of Delegates chose for President-Elect of the American Medical Association, Edward H. Carey, of Dallas, who has been a member of the Section on Ophthalmology since 1906, and has given faithful service as a member of the Board of Trustees. The next meeting of the Association will be held in New Orleans, probably in the early spring.

Edward Jackson.

AMERICAN QUACKERY IN EUROPE

In fundamental habits of thinking, it may appear doubtful whether the average citizen of the twentieth century has reached a much higher plane than the Assyrian of sixty centuries ago, in spite of modern education and the really high development of scientific thought among a few choice minds.

The adage so generally attributed to a popular showman and according to which, folly of the congenital variety holds almost universal sway, is well exemplified by the fact that neither monarchy nor republic, neither old country nor new, is immune to the impostures of the medical quack.

Some who believe in the superior intelligence of every country but their own may be shocked to find that so questionable a manifestation of American "progress" as that peculiar "school" with which the throwing away of glasses has been associated has invaded Germany. Yet the Berlin Ophthalmological Society recently found occasion to pass a formal resolution against so-called "sight schools" and it appeared that an organization engaged in preaching (for a consideration) this gospel had recently become active in Berlin.

How like an echo of ophthalmological experience in the United States sounds the comment which developed in discussion, to the effect that it was above all desirable to enlighten the doctors, because in many instances they were not properly informed as to the quackish character of the "sight schools". Can it be that the teaching of ophthalmology in medical colleges falls upon ground almost as barren as that to which general science instruction is applied in the high schools?

The living optical instrument known as the eyeball consists approximately of a sphere about one inch in diameter within which is placed a natural lens, delicately suspended but under the control of a tiny muscular system. Almost imperceptible variations in the curvature of the front of this approximate sphere, or in the curvature of the tiny natural lens, or in the length of the spheroid ball, produce decided disabilities as to accuracy of vision, or the presence of eyestrain. The quacks who, purely for their own financial advantage, have exploited the ignorance or stupidity of patients in this and other civilized countries would have us believe that a series of "exercises" of the eye, applied indiscriminately to every optical defect of ocular structure, is capable of readjusting that structure so as to correct the defect and to render the use of spectacles unnecessary.

Unfortunately the law, here and elsewhere, seems incapable of protecting the public against such gentry. The factors which favor their prosperity are natural folly, the existence of a large section of the public which is equally ready to believe in the reality of imaginary diseases and imaginary cures, and last but not least the fact that the therapeutics of refraction in medical practice are too often greatly inferior to medical science.

W. H. Crisp.

RADICAL OPERATION FOR DESTRUCTIVE EXOPHTHALMOS

Considering exophthalmos from the point of view of the danger to the cornea, in those cases in which the condition is so pronounced that the lids fail to cover and protect this organ, there is no entirely satisfactory therapy. The underlying cause is usually an exophthalmic goitre of considerable activity. Partial thyroidectomy is often effectual in reducing the exophthalmos. There remains, however, the small but

terrifying group in which the ocular prominence is entirely or largely unaffected by this operation.

As a palliative, the instillation of bland ointments or oils is of great value in preventing the drying of the cornea. This, however, interferes with vision and is at best only a temporary expedient. To the same category belong the suturing of the lids or the sealing of the eyes with collodion applied to the lashes of the upper lid against the lower lid. If these measures can be used they protect the eyeball but they are obviously impermanent. A tarsorrhaphy which permanently closes the outer portion of the palpebral fissure has been used advantageously in certain cases. Excision of the superior cervical sympathetic glanglion must be considered as enophthalmos has usually followed its removal. This operation or its modification was performed rather considerably from about 1895, at the suggestion of Edmonds, for a number of years, as a treatment of exophthalmic goitre. It was later abandoned because of the better results from resection of part of the thyroid.

Sympathectomy was revived as a treatment for glaucoma. Here again the procedure was given up because of better operations for the disease and also, because the operation was not without some danger to the patient, several deaths having followed it. A disfiguring ptosis with elevation of the lower lid has been noted as an unfortunate sequel.

As a last resort in the most extreme cases, Kuhnt has advocated removal of the temporal orbital wall. This may impair the function of the external rectus muscle and its effectiveness has not been proved.

In one of these desperate cases Naffziger removed the roof of the orbit including the roof of the optic foramen, operating through the cranium, with a good result.

Sachs performed a similar operation except that he did not remove the roof of the optic foramen. Immediately upon the incision of Tenon's capsule there occurred a rounded protrusion about two centimeters in diameter. The exophthalmos receded about 15 mm. and the lids could easily be closed. The good result lasted only about a week or ten days by which time the exophthalmos had returned to its former extent. Craniotomy was again performed, the line of the former incision being followed and the bone flap laid down as previously. The frontal lobe was then retracted with considerably more difficulty than at the first operation. The defect in the orbital wall was replaced by what appeared to be a one or two millimeter thick, organized blood clot. This was peeled away but beneath it there was no longer a hernia through Tenon's capsule which structure seemed now to be replaced by another dense membrane. This was removed piece by piece with great difficulty as it was firmly adherent to the underlying structures and very friable. After its excision a small amount of bone over the optic foramen was rongeured away but no hernia resulted. There was only partial and temporary recession of the exophthalmos following this second operation.

In this particular case failure may have been due to the formation of the organized blood clot and membrane which acted as a restraint just as Tenon's capsule had previously done. If there had not been bleeding following the first operation it is possible that the orbital decompression would have been a success.

Another possibility is that the hernia was not maintained because the postoperative refilling of the ventricles with increased intracranial pressure was sufficient to push the hernia back into the orbit, the brain weight and normal fluid pressure being greater than the backward pull of the extraocular muscles. Klemme has suggested covering the hernia with a celluloid cap to protect it from pressure from above but this has not thus far been tried.

Such an operation seems radical to the ophthalmologist though the brain surgeon does not regard a craniotomy with anything like the same apprehension with which those not of that specialty consider such an undertaking.

Whether this proceeding will prove to be a valuable contribution to ophthalmology is questionable but at least

it is an interesting, though heroic, attempt to circumvent a destructive process. *Lawrence T. Post.*

THE TABLE OF CONTENTS

It might be well to explain to our readers that the very small type used in the table of contents for July and August was necessitated by the large number of original articles in these issues of the Journal, there being about twice as many as customary. It will probably not be necessary to continue for many months this increase in size of the Journal but it seemed advisable to do so temporarily in order to publish without undue delay the unusual amount of original material on hand.

Lawrence T. Post.

BOOK NOTICES

Revue de Chirurgie Plastique, 1931, no. 1, April, 90 pages, many illustrations.

This is the first number of a new journal. The purpose of this publication is to cater to the special field of plastic surgery and it is to contain articles of "reparative plastic and esthetic surgery. It deals likewise with the progress of maxillo-facial orthopedy and of restorative prothesis as also with all the efforts made in medical spheres toward morphological improvement". Original articles may be published in French, English, German, Italian or Spanish. Three summaries will follow the article, one in French, one in German and one in English. Following the department of original articles there is one of "clinical facts". Apparently this will be used for case reports. The next department is that of societies, then follow book reviews.

The articles in the first volume would not be of special interest to the ophthalmologist as none refers directly to plastic surgery about the eyes.

Lawrence T. Post.

Proceedings of the All-India Ophthalmological Society, Volume I, 1930. Cloth, 110 pages, five illustrations in text. The Huxley Press, 114 Armenian St., G.T., Madras.

The All-India Ophthalmological Society was organized in 1930 and at the first annual meeting consisted of sixty-four members. As stated by Dr. B. P. Banaji, Chairman of the Reception Committee, the society was brought into existence in an effort to coordinate the efforts of individual workers, to disseminate ophthalmic knowledge, and to cooperate with the ophthalmic surgeons of Europe in mitigating the ravages of contagious eye diseases, amongst which trachoma stands predominant. He also stated that the mental equipment of the Indian was on a par with that of his brothers in the west, and now that the bar from his attaining the highest posts in the presidency hospitals was removed, we could confidently look forward to a time when Indian eye surgeons would take their legitimate place in the front rank of ophthalmologists of the world.

Fourteen original papers are presented covering varied subjects. Among these are: Distribution of trachoma in India and some points with regard to its treatment, by C. N. Shroff; Parenteral injections of milk for spring catarrh, by B. P. Banaji; Eye affections in leprosy, by R. P. Ratnaker; Treatment of corneal ulcers, by B. G. S. Acharya; Ocular dominance, by G. Zachariah.

Of special interest is a historical summary of ancient Indian ophthalmology by D. D. Sathaye entitled Eye diseases in the time of Shushrut and their treatment. The operation of couching of the lens was first described by Shushrut prior to 350 B.C. and remained the premier cataract operation until 1746 when Daviel undertook the first cataract extraction. Shushrat was an anatomist and also a surgeon. His great work, known as Shushrut Sanhita, is the most systematic work on surgery of ancient times. He strongly recommended that if one wished to learn surgery he must dissect a dead body. Nineteen chapters are devoted to eye diseases of which seventy-six are described. Eleven diseases are to be treated by incision, nine by scarification, five by excision, fifteen by venesection, seven by palliative measures, and the rest are to be given up as incurable. *Phillips Thygeson.*

Die juvenile amaurotische Idiotie, klinische und erblichkeitsmedizinische Untersuchungen (Juvenile amaurotic idiocy, clinical and medico-hereditary researches). By Torsten Sjorgren, State Institute for Racial Biology, Uppsala and S; T. Lars Sjukhus, Lund. Paper covers, 426 pages, numerous tables and geneological trees. Price, 15 Swedish crowns. Reprinted from Hereditas, volume 14, 1931.

The monograph represents the result of a great deal of painstaking work in studying juvenile amaurotic family idiocy in Sweden.

It is divided into the following six chapters: (a) Introduction; (b) Material and method of examination; (c) The author's own material; (d) Clinical analysis of the material; (e) Analysis from the heritary-biological aspect; (f) Conclusions.

In the introduction, an extensive review is made of the literature on juvenile amaurotic family idiocy. This is followed by a careful, detailed study of fifty families in which one or more members had the disease. The records of the cases are very complete and in many instances, include post-mortem microscopic study.

Of special interest to ophthalmologists, is the characteristic fundus picture. In the early stages, the disc is yellow-gray and the vessels thin. In the later stages, there are degenerative retinal changes with pigment proliferation in the periphery, together with round, yellowish foci resembling partial choroidal atrophy. In the end stage, the disc is yellowish-white with thread-like vessels, while in the periphery are variable amounts of pigment changes of the bone corpuscle type. There is an excellent description of the neurological symptoms and the differential diagnosis is also thoroughly discussed.

From the statistics, it would seem the percentage of cases in Sweden is higher than in other countries. There is also a tendency for grouping of cases in limited areas in various portions of the country. The ophthalmoscopic findings and the neurological symptoms show a uniformity and consistency in the progressive development. The typical course and the symptomatology of the disease is well described. The disease shows such a characteristic picture that a positive clinical diagnosis can almost always be made.

Juvenile amaurotic idiocy, in all probability, follows a recessive and monohybrid hereditary course. From a hereditary biological aspect, the author regards the disease as entirely distinct from the infantile type. Of further interest, was the high instance of dementia praecox, mental deficiency and epilepsy among the brothers and sisters of these patients.

The monograph is interesting and well worth reading.

A very extensive bibliography is also included. *Frederick C. Cordes.*

L'Hérédité en Ophthalmologie. M. Van Duyse. M. D. Paper, octavo, 163 pages, 52 charts, 5 tables. Paris, Masson et Cie, 1931.

This monograph was presented at the French Society of Ophthalmology May 5, 1931. It is divided in two parts, the first dealing with the fundamentals involved in the science of heredity. A comprehensive and detailed account is given on this subject. The material is well arranged and numerous subheads make the text easily followed.

The second part considers those ophthalmic conditions that show hereditary tendencies. Under Mendelien dominant types the author lists cataracts, both congenital and adult forms; ectopia lenticularis; glaucoma, juvenile and adult; certain sclerotic affections; and affections of the lacrimal apparatus. In the recessive type are albinism and retinal degenerations. A third type, in which the condition is passed through the mother, includes color blindness; Leber's disease; a familial nystagmus; megalocornea and a form of hydrophthalmia.

Under the fourth heading is listed malformations of which the mode of transmission is not well defined. Coloboma, aniridia, microphthalmia and such are in this class.

Lastly neuro-ocular affections are considered, such as congenital ptosis. This condition when associated with

other anomalies of the eye or adnexia is transmitted as a dominant characteristic.

The author distinguishes different types of congenital cataract as shown by the slit-lamp. In subjects of the same family different types may be found. Several authors are quoted, incriminating endocrine disturbances, rickets, tetany, nutritional disturbances and other causes as being responsible for zonular cataract. The tendency to congenital cataract is transmitted as a dominant hereditary characteristic.

The hereditary aspects of senile cataract are little known because one observer at most can only follow two generations, because accurate geneological reports are few and our classification and diagnosis have developed only recently by the slit-lamp. This form of cataract also is transmitted as a dominant characteristic.

An interesting phenomenon known as "anticipation" is mentioned. A report of a family is quoted as being most demonstrative. In the first generation the cataract appeared in old age; in the second generation at forty years of age; in the third at thirty years and in the fourth generation in a child of seven years. *H. Rommel Hildreth.*

Transactions Pacific Coast Oto-Ophthalmological Society, Victoria, B.C., September 1930. Paper, octavo, 227 pages, 22 illustrations. Published by the Society, Walter F. Hoffman, Secretary.

This volume, while corresponding in general form to its predecessors, is notably improved in typography and press work. Of the papers it contains, two-thirds relate to ophthalmology. Much of interest was included in the papers of those who were present as guests. N. Bishop Harman of London, repeated the address he had given the week before, as President of the Section on Ophthalmology of the British Medical Association, at Winnipeg; on "The Control of Trachoma". L. Vernon Cargill, of London, spoke of "The Management and Treatment of Incipient Cataract"; and showed a series of drawings of fundus conditions, which had been reproduced by photography and colored for exhibition on the screen.

Dr. George F. Libby, formerly of Denver, but now residing in Victoria, took up "Focal Infection with Respect to the Eye", illustrating that there are subjects which can be better studied in private practice than in large metropolitan clinics. This thought is also suggested by the report of a unique case of "Keratitis Exfoliativa Arsenicalis", by Fred T. Hyde of Port Angeles. This condition complicated dermatitis, following administration of neo-arsphenamin. Another case here reported, by W. D. Horner and F C. Cordes of San Francisco, was one of "Metastatic Abscess of Iris and Ciliary Body"; following abscess near the angle of the lower jaw. The pathological report on the enucleated eye was made by G. Y. Rusk.

There is interesting history in this volume. The first attempt to organize the Society was made in connection with the Semi-Centennial Meeting of the California State Medical Society, at San Francisco in 1906. But after the first day of that meeting came the earthquake. No further efforts were made toward organization until 1911, when the Lane Lectures were delivered in San Francisco by Prof. E. Fuchs. Then, under the influence of Dr. Adolph Barkan, an organization was effected; and in 1913 a meeting was held at Portland, Oregon, with Dr. J. F. Dickson of that city, as President.

The Society has a striking list of Honorary Members, most of whom have rendered active service to it. Of these fifteen are ophthalmologists, including men so widely separated as Col. Robert H. Elliot, of London, at Seattle in 1914; Sir John Parsons of London, at Portland in 1916, who attended the meetings; John E. Weeks formerly of New York City, Allen Greenwood and W. B. Lancaster of Boston, Luther Peter of Philadelphia. W. R. Parker of Detroit, W. H. Wilder and C. W. Hawley of Chicago, and W. L. Benedict of the Mayo Clinic. The oto-laryngologists are also widely representative, and include the names of Mosher of Boston, Lynch of New Orleans, Beck and Pierce of Chicago, Reik of Atlantic

City, Shurly of Detroit, and Skillern of Philadelphia. The activity of this Society has given it a history of interest beyond its geographic limits; while the names of Martin Fischer of Cincinnati, and George W. Swift of Seattle, show that interest extends beyond the boundaries of its special branches of medicine.

Separation from eastern special societies also favors broad representation of medicine in the Pacific Coast programs. Dr. Laurence of Vancouver reported recent observations in Vienna Clinics; and Dr. Murphy, of Everett, a case of skull fracture complicated by drainage of spinal fluid from the ear. Operations attracted the usual attention. O'Connor gave a new account of his "cinch shortening loop" in muscle surgery. Swett described a new procedure for glaucoma—incarceration of iris strips. Martin reported successful intra-temporal suture of the facial nerve. These transactions are worthy of a place in any ophthalmological library; and especially as the discussion on the various papers are well reported.

Edward Jackson.

American Academy of Ophthalmology and Oto-Laryngology, Transactions for 1930. Cloth, Octavo, 652 pages. Illustrated. Published by the Academy. St. Louis, 1931.

The thirty-fifth annual meeting having been held the last of October, it is by no fault of the new editors or printers, or even delay on the part of the reviewer, that this notice appears more than a year and a half after that of the volume immediately preceding. Many of the readers already have it on their shelves, many have not; and of those who already have it where they can refer to it, few are familiar with its contents.

The first section of the book gives the proceedings of the joint session including the President's address by William H. Wilder, the address of the Guest of Honor, Prof. Emile de Grosz of the University of Budapest, on "The Etiology of Retrobulbar Neuritis"; and other papers contributed to a symposium on "Diseases of the Para-nasal Sinuses and Their Relation to Disorders of the Eye", by Prof. James A. Babbitt, of Philadelphia, and Prof. Sanford R. Gifford, of Chicago. The Ophthalmologic Session, occupies 258 pages, the Oto-Laryngologic Session 133 pages. The list of speakers who presented instructional subjects includes the names of 76 teachers who took part, and the subjects which each presented. The work of the instructional section has become a most important part of the work of the Academy. The presentation of instruments and appliances brought out only six claimants for the attention of hearers and readers. The minutes, necrology list, directory and index occupy 74 pages.

The four pages given to photographs of officers replace any frontispiece and give readers an opportunity to become somewhat acquainted with the prominent members of the Academy, and will, in later years, have a certain historical value. This is a solid imposing looking volume; but as compared with the contemporary transactions of other ophthalmological societies, its heavy paper and some blank pages detract from its convenience and relative importance. But there are parts of this volume that will be suggestive and of service to every ophthalmologist.

Outstanding features are: The symposium on Trachoma opened by Prof. Emile de Grosz and shared in by J. A. Stucky, also a veteran in the war with trachoma, and now gone from us: and P. K. Olitsky, of New York, and Charles Weiss of St. Louis, who approach the problem of trachoma from experimental and bacteriological side. The report of the Research Fellow in Ophthalmology upon "Calcium in Relation to Cataract" occupies 50 pages. While its conclusions are mainly negative it tells of an important piece of laboratory work on its subject, which will be often consulted, even if future discussions on the etiology of cataract lead in other directions. Other scientific contributions are two papers from Philadelphia on "Tay-Sachs' Disease—amaurotic family idiocy. One by Dr. Goutermann is a review of the literature. The other by Dr. Winkelman, is a study of the histo-pathology, based

on two cases. There is also a paper by Dr. Goldstein and Dr. Wexler, of New York on "Rosette Formation in Eyes of Irradiate Human Embryos". Among thoroughly practical papers are; one by Dorland Smith on "Estimation of Total Refractive Error Without a Cycloplegic"; "A Tucking Method in Muscle Surgery", by Drs. Burch and Grant, of St. Paul; and "Cases of Lattice Keratitis" by Allen Greenwood, of Boston, who reports four cases observed in one family. This volume maintains the claim of its predecessors to usefulness in any ophthalmic library.

Edward Jackson.

OBITUARY

S. S. Golovin

On April 28, 1931, Professor S. S. Golovin died in Moscow, Russia, at the age of sixty-five years. He was the dean of Russian oculists and for years an outstanding figure in international ophthalmology. Golovin's name is probably best known to the American reader in connection with "his combined exenteration of the orbit and accessory nasal sinuses" (Exenteratio orbitosinualis) in the treatment of orbital malignancy, a method described in detail in C. Wood's "System of Ophthalmic Operations" and in the American Encyclopedia of Ophthalmology. This procedure is only one of the many important contributions which link Golovin's name with the progress of orbital surgery in the last thirty years. He originated the method of litigating the orbital veins in pulsating exophthalmos. He introduced the optico-ciliary neurectomy in absolute Glaucoma. His simple and osseous orbitotomies are still used by many orbital surgeons. In the difficult field of plastic restoration of the orbit following its exenteration, Golovin proposed a new method, both simple and effective. His interest in the orbit was not limited to surgery. In a large monograph devoted to optic nerve tumors, he displayed the qualities of an acute clinical observer and of an accomplished pathologist. His report on intradural tumors of the optic nerve presented to the International Congress in 1913 was a turning point in the general conception of this type of orbital neoplasm. He described an hitherto unknown orbital disease which he named "sclerosis orbitae".

The creative genius of Golovin has manifested itself not only in clinical, but in experimental ophthalmology as well. In 1904 he offered, as the result of ingenious experiments, a new "cytotoxic" theory of sympathetic ophthalmia. With this the foundation was laid for the future anaphylactic interpretation of this disease. His experiments on the sub-vital processes in the isolated eye, performed in recent years, were an interesting attempt to penetrate the mysteries of fundamental "life" processes in the visual organ.

To enumerate all the new ideas which were given by Golovin to ophthalmology, would mean to review most of his ninety-five scientific publications. How highly he was esteemed by his European colleagues can be seen from the fact that in 1929, the Russian Ophthalmologic Journal celebrated the forty years of his ophthalmologic activities by issuing a special "Golovin" number of the Journal. So many ophthalmologists paid their respects to him by sending their contributions that a volume of two hundred and sixty pages had to be published and still a part of the material had to be transferred to the succeeding issues of the Journal. The names of Axenfeld, Morax, Elshnig, Rollet, Terrien, Kruckman, Wagenmann, Szily and others who participated in this volume, prove that Golovin's jubileum was an event in European Ophthalmology.

In his own country Golovin was more than a research worker of great ability. He was an inspiring teacher, and many of his pupils head the ophthalmic departments in the Medical Schools of his country. For years he was editor of the "Vestnik Oftalmologii", at that time the only ophthalmologic periodical in the Russian language. His textbook on "The Methods of Examination and Symptomatology of Ocular Diseases", a volume of nine hundred and sixty pages, is most popular among Russian oculists. *M. Beigelman.*

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history

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1. GENERAL METHODS OF DIAGNOSIS

Cosmettatos, G. **Some difficulties in the diagnosis of ocular tuberculosis.** Rev. Gen. d'Opht., 1930, v. 44, Feb., p. 57.

The writer calls attention to the difficulty in distinguishing tuberculous ocular disease from that due to certain other general causes. He praises the biologic method of Blanc and Caminopetros which is especially useful in doubtful cases of tuberculosis of the conjunctiva. The method consists in removing some of the suspected tissue, pounding it in physiological serum and injecting the product under the conjunctiva of a hare. If the tissue is tuberculous, characteristic lesions will appear in the conjunctiva of the test animal in twenty days. The writer warns against confusing certain atypical forms of trachoma with tuberculous conjunctivitis.

Histological sections of a tuberculous eye showed numerous acidophilous mast cells, colored an intense red by eosin. These represent inflammatory cells, and A. Fuchs describes them as occurring in sections of eyes removed for various inflammations and traumas, and regards them as old or degenerate forms of plasma cells. The author notes the presence of these acidophilous cells at an early stage of a tuberculous inflammation of the iris and ciliary body. *J. B. Thomas.*

Lacarrère, J. L. **A simple registering photocampimeter.** Klin. M. f. Augenh., 1931, v. 86, Feb., p. 233.

The instrument is described and illustrated. The author claims for it the following advantages: free change of fixation distance, intensity of illumination and size and color of the indicators; their application for distances through light projection; small size.

C. Zimmermann.

Mendoza, R. **The anaglyphs.** Arch de Oft. Hisp.-Amer., 1931, v. 31, Jan., p. 43.

To secure stereopsis in the examination of a single x-ray plate, the author employs a modification of the principle of the anaglyphs. The transparent plate is viewed through a red filter on one eye and a green one on the other combined with prisms of three degrees bases in for vision in divergence, or prisms of eight degrees bases out for vision in convergence. One of the prisms is rotated up and the other down to produce a vertical disparation. The color filters and the combined horizontal and vertical disparation hold fusion in check, and result in depth perception. *M. Davidson.*

Pavkovits-Bugarsky, G. **The value of the rapidity of sedimentation of red blood cells in ophthalmic diseases.** Ann. d'Ocul., 1931, v. 168, April, pp. 288-303.

This test was used in a variety of inflammatory conditions of the eye, and sedimentation was found to be accelerated. It has little diagnostic value, but is helpful in prognosis.

H. Rommel Hildreth.

Soria, M. E. **Biomicroscopy of the iris.** Arch de Oft. Hisp.-Amer., 1930, v. 30, Nov., p. 581.

Biomicroscopy may be the sole means of preclinical diagnosis in many conditions, but in the clinical stage in which patients reach us in practice it is not indispensable. It is an aid to diagnosis, confirms it, and often helps us in revealing lesions beyond the iris which are inaccessible to focal illumination. Some observations as a result of a special slit-lamp study of the iris are as follows: The low power has been found more useful in the presence of a cloudy cornea or aqueous. The sphincter is visible in twenty-five to thirty percent of normal Spaniards. Heterochromia has been seen much more frequently than was formerly believed. With still greater frequency was found partial chromoheteropia, or differently colored sectors in the same eye. Atrophic patches have been observed after absorption of blood from iris stroma following injuries. Invasion of pigment epithelium through the stroma in the form of a dark arching line along a pearl cyst has been encountered, as well as its proliferation as a membrane around the pupillary border. Little or no inflammatory zone was noted around tuberculous iris nodules, while a rather marked zone was found around luetic nodules. Their location was found to have no differential diagnostic value. Depigmentation of the iris has not been found to be pathognomonic of glaucoma, nor has the degree of iris degeneration been found to bear any relation to the stage of glaucoma. Incidentally, the greater the degeneration of the iris the lesser the result from a fistulizing operation in glaucoma. A heavy vein near the angle was observed in a glaucoma case: it disappeared after an iridectomy and its relation to the glaucomatous condition was thus evident. *M. Davidson.*

2. THERAPEUTICS AND OPERATIONS

Chang, S. P. **A contribution to radium treatment in ophthalmology (corneal fistula and retinitis proliferans).** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 81.

The author treated five cases of corneal fistula and three cases of retinitis proliferans with radium. The fistulæ were treated with 10 mg. of radium applied directly to the cornea through a secondary filter of guttapercha. The number of treatments varied from one to four. A satisfactory result was obtained in two cases only. The radium destroys the epithelial cells lining the fistula and allows healing to take place.

Only one case of retinitis proliferans was reported, as the other two were not completed. The reported case was treated with four applications of 60 mg. of radium at a distance of 1 cm. from the cornea through a brass filter 1 mm. thick and a secondary guttapercha filter. The result obtained was unsatisfactory as there was recurrence of hemorrhage.

The author concludes that only recent cases of corneal fistula are suitable for radium treatment, and that so far, radium treatment in cases of retinitis proliferans is not very promising, but that experiments should be continued with a modification of the technique. *M. E. Marcove.*

Fischer, F. P. **The clinical importance of the permeability of the cornea.** Klin M. f. Augenh., 1931, v. 86, March, p. 298.

Nine-tenths of substances introduced into the conjunctival sac enter the interior of the eye through the cornea, one-tenth through the conjunctiva. The permeability of the cornea chiefly depends on the condition of the epithelium and endothelium. The epithelium lets one and the same substance

through only in a certain direction, and the greater amount depends on the greater degree of swelling of the epithelium. Fischer studied experimentally the permeability of the cornea for atropin, scopolamin, eserin, and pilocarpin by increasing the degree of swelling by addition of certain substances. For atropin, for example, he gives this combination: atropin nitrate 0.1, sodium bicarbonate 0.03, sodium chlorate 0.04, distilled water to 10.00 at 30 degrees C. *C. Zimmermann.*

Genet. **Rapid death with high temperature and pallor, in infants subjected to operation.** Bull. Soc. d'Opht. de Lyon, 1930, v. 18, p. 32.

Moreau reported several cases in 1914 and 1919. In 1929 Ombredane and Armingeat published a very important report on the above syndrome. Genet reports two cases: (1) In an infant of six months operated on for congenital cyst of the eyelid. Rapid rise of temperature the same evening and death the second day. (2) In an infant of four months. Double iridectomy for zonular cataracts. Light anesthesia. Rapid rise of temperature, pallor and death fourteen hours after the operation.

This accident occurs with maximum frequency between six days and six months. Choice of anesthetic seems to play no part. Physiologists admit that the nursling does not possess a thermic regulator. Many factors such as agitation, loss of fluid, nervous reflexes, and so on, may cause high temperature in the infant.

Treatment: Before operation no purgation, no washing. During operation complete anesthesia, work fast. If fever develops rapidly, use cold bathing, ice on abdomen, adrenalin, digitalin by vein or superior longitudinal sinus, blood transfusion, lumbar puncture.

As it is most common in head surgery, irritation of the trifacial has been suggested as a possible factor. It is worthy of note that the two cases reported by Genet were operated upon for congenital defects.

J. B. Thomas.

Gourfein, D. **Local immunity of the visual organ.** Rev. Gen. d'Opht., 1930, v. 44, Jan., p. 5.

The eye occupies a unique position in the organism in regard to immunity. The presence of antibodies in the blood serum does not always confer immunity on the eye even when the entire organism is immunized. Axenfeld immunized hares against the pneumococcus, and, although an intravenous injection of several times the usually fatal dose caused no morbid phenomena in the animals, a minute dose injected into the vitreous caused panophthalmitis.

Gourfein maintains that the cornea also fails to share in the general immunity. He gives the results of experiments on the eyes of hares, in which he attempted local immunization against the tubercle bacillus, the staphylococcus aureus, and the streptococcus. The vaccines, prepared according to the method of Besredka, were instilled into the conjunctival cul-de-sac several times a day and injected subconjunctivally during three or four days. The vaccinated and control eyes then received the same quantity of bacterial culture, but local immunity was not obtained. The writer concludes that his experiments and those of others using the same method prove that the true method of obtaining local immunization of the eye has not been discovered.

J. B. Thomas.

Kiang, S. M. **Relative value of miotics and mydriatics applied in the form of solutions and ointments.** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 67.

The author compares the therapeutic effect of various common miotics and mydriatics in solution and ointment form. Patients without external disease were selected. The pupils were carefully measured in strong daylight and when the patient was looking at a distance. The ointment was placed in the conjunctival sac of one eye and the solution in that of the other, after which the eyes were closed. During the first hour, the pupil was measured every fifteen minutes, during the sec-

ond hour every half-hour, and then hourly for eight or nine hours.

For two percent pilocarpin the action of the ointment appeared quicker and was more pronounced than that of the solution. The maximum action was reached in two hours and remained for two hours. The pupil enlarged more slowly in the eye in which the ointment was used. With a one percent atropin solution, the maximum action of both forms of the drug was reached in one hour's time. The pupils were almost equal in size, but after a few days the action following the ointment was more pronounced. With two percent homatropin the maximum action with both forms was reached in one hour and remained three hours with the aqueous solution and nine hours with the ointment. The action of the ointment lasted two days, while that of the solution lasted only twenty-eight hours. The effect of one percent eserin was studied with aqueous solution, oily solution and ointment. The effect of both the oily solution and the ointment was reached sooner and was more pronounced than that of the aqueous form. There was very little difference between the ointment and the oily solution.

M. E. Marcove.

Poos, F. **Toxic-inflammatory actions of some of our usual alkaloids on the eye.** Klin. M. f. Augenh., 1931, v. 86, Feb., p. 171.

Poos shows that the usual alkaloids locally applied to the eye have, aside from their pharmacological, also toxic effects which can easily be recognized histologically. This toxic action chiefly attacks the vascular walls, producing changes in the tissues which can scarcely be distinguished from acute inflammatory conditions. The effects of cocaine, atropin, and erythroplein are discussed in much detail, with histological illustrations. The toxic action of cocaine on the bloodvessels, which may lead to complete atony, intensely favors hemorrhages during and after operations opening the eyeball. Especially in old people a ten percent solution, of cocaine, if applied more than once, is such a toxic dose.

C. Zimmermann.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Ferree, C. E., Rand, G., and Hardy, C. **Refraction for the peripheral field of vision.** Arch. of Ophth., 1931, v. 5, May, pp. 717-731.

By means of a Zeiss refractometer with certain necessary modifications, the temporal and nasal peripheral fields were examined out as far as sixty degrees. Twenty-one eyes were selected, some with slight central error of refraction, some with high grade error of refraction. In one group, the eyes were found more myopic toward the periphery of the horizontal meridian, and more hyperopic in the vertical, resulting in all but one case in mixed astigmatism in the peripheral field. In the second group, the contrary condition was found, resulting in compound hyperopic astigmatism in the peripheral field, though it is conceivable that in the presence of high central myopia a compound myopic astigmatism might result. In a third group were placed those in which the astigmatism was asymmetrical for the nasal and temporal halves. As a rule, there is greater myopia and less hyperopia for one half than for the other. With continued fixation, a tendency toward myopia develops. This change took place in all eyes examined with eccentric fixation, and also in some eyes when a far fixation was taken in the median plane, and did not depend upon the use of a cycloplegic. This points to the possibility of permanent elongation of the eyeball by pressure of the muscles, and to a temporary elongation as a result of the action of the extraocular muscles, facts which are of interest in connection with the various theories of accommodation and the ability of some aphakic eyes to accommodate for near without the addition of reading glasses to their distant correction. *M. H. Post.*

John, I. **Chinese test cards for near vision.** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 58.

Until the present time there have been in the Chinese language no test-cards for either distance or near which conformed to the visual angle theory. For distance Snellen hooks and Lan-

dolt circles have been used satisfactorily. For near, however, Jaeger test cards in English have been used, but with little satisfaction. The author, therefore, has devised two kinds of test-card in Chinese, one with simple and single optotypes, the design of which is based on the one-minute-visual-angle theory, to be used for determining the visual acuity for near, the accommodative power, and also the distant point in myopia; the other with reading text to be used for determining the proper reading glasses. *M. E. Marcove.*

Levinsohn, G. **Anatomy of the optic nerve fiber lemniscus (sehnervenfaserschleife) in the produced myopia of apes.** Arch. f. Augenh., 1931, v. 104, May, pp. 82-88.

Levinsohn takes exception to Scheerer's criticism of his work on the production of myopia in apes and he defends his own previously published conclusions. He feels that Scheerer's opinion is ill founded particularly as regards these changes being congenital.
Frederick C. Cordes.

Lythgoe, R. **Dark adaptation and the peripheral color sensations of normal subjects.** Brit. Jour. Ophth., 1931, v. 15, April, p. 193.

This contributor discusses the historical and theoretical phases of his subject. He sets forth the object of his experiments, the apparatus used, the method of its application, and the results. His investigations are summarized as follows: (1) Experiments were made with a view to determining the influence of the adaptation of the eye on hue discrimination in the central and peripheral parts of the retina. (2) During dark adaptation color sensations are much desaturated and hue discrimination is less acute. (3) The possible causes of this diminished acuteness of hue discrimination are discussed. It is due either to (a) the suppression of the mechanism of color perception during dark adaptation; (b) swamping of the sensation by an achromatic rod response; or (c) the presence of pigments within the eye. The results do not point unequivocably to any one of these causes. Forty-one references, one diagram of apparatus, and one chart accompany this contribution.
D. F. Harbridge.

Marchesani, O. **Experimental myopia in apes.** Arch. f. Augenh., 1931, v. 104, May, pp. 177-191.

Marchesani has repeated Levinsohn's work on myopia in apes and reports his conclusions after an observation of two and a half years. In all, fourteen young animals were used. Of this number, a certain group was used as a control. In the early stage of the experiment, it was observed that some of the animals developed a progressive myopia. This might have been interpreted as the result of the experiment. However, during this period a number of the control animals also showed the same phenomenon. After the experiment had been under progress for some time, the animals were set free and the control animals were then used. From these experiments, it was apparent that the animals fell into two groups, the one in which there was no apparent change in refraction, and the other with myopia. Whether or not the animal was used in the experiment made no apparent difference. In one ape the myopia progressed while under experiment but ceased when the ape was set free; in another the reverse process was present. Because of the frequency of spontaneous myopia in apes, Marschesani feels it is difficult to draw definite conclusions. *Frederick C. Cordes.*

Pagenstecher, Adolf. **Stenopeic spectacles.** Klin. M. f. Augenh., 1931, v. 86, March, p. 362.

In cases with opacities of the refracting media, especially of the cornea, myopia and incipient cataract vision for reading may sometimes be improved by placing a hard rubber plate with a horizontal stenopeic slit in front of the correcting lens. Twenty years ago Pagenstecher devised for the street a dark glass with horizontal slit placed in front of the correcting distance lens. The patient sees distinctly through the slit, and through the dark glass he has enough orientation, not being disturbed by the limitation of the visual field.
C. Zimmermann.

Rochat, G. F. **Instrument for rapidly measuring the correct values for different distances of spectacle lenses from the cornea.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 28.

As the required calculations are only necessary for lenses above 5 D. the scale is 20 cm. long. Its application is described in detail. It can also be used for measuring pupillary distance and toric lenses. *C. Zimmermann.*

Rollett, J. **Cure of a patient congenitally blind. Late results.** Bull. Soc. d'Opht. de Lyon, 1930, v. 18, p. 128.

The original report of a cataract operation was made two years ago. At first this little girl could not recognize by sight alone objects which she recognized perfectly by touch. She seemed not to understand how to use this sense so suddenly given to her but little by little became familiar with it. O.D.V. = 1/4; O.S.V. = 1/6. The general visual effect is excellent. She is very helpful to her peasant family.

Observation of this child confirms results in the majority of carefully observed cases, and justifies the following conclusions: (1) As Diderot says in his famous "letter on the blind", "The eye must learn to see, just as the tongue must learn to talk". (2) This education is possible only on condition that the optic pathways and the higher visual centers are normal.

J. B. Thomas.

Seka, W. A. **Refraction of Turcotartar peoples.** Klin. M. f. Augenh., 1931, v. 86, March, p. 348.

Seka reports on his examinations of 1,500 school children of the ages between five and twenty-four years in Chiwa and 600 between the ages of six and nineteen years in Krasnowodsk. The ophthalmological characteristics suggested that in Krasnowodsk much better living and cultural conditions and oculist care had continued for years. The details are discussed and arranged in tabular form. The author gained the impression that primitive people retain the hypermetropic basal refraction longer and more tenaciously than more cultivated people.

C. Zimmermann.

4. OCULAR MOVEMENTS

Abraham, S. V. **Heterophorias: 1. A new test for vertical phorias with observations on patients with presumably negative histories.** Arch. of Ophth., 1931, v. 5, May, pp. 766-780.

The fault of the majority of tests of the phorias lies in the fact that they are dependent upon abolishing the fusion faculty. The author, therefore, proposes a test in two steps, in the first of which the fusion faculty is not abolished. The first step may be known as the duction test. It is continued to the point of establishment of equilibrium of innervation, evidenced by the ability to get consistent and constant readings. In the second part, a Maddox rod test is made after production of this presumed innervational equilibrium. The De Zeng phorometer is used. The Maddox rod test is first made in the usual manner and the reading taken. The rod is then removed and a rotary prism with a zero mark at 180 degrees is slowly rotated upward and downward before either eye, the patient counting the images, "two-one, two-one", et cetera, until this is done at least three times in each direction. It is finally stopped as the patient says "two", and the amount of the reading recorded as being so much either up or down. The contrary excursion is next recorded after similar preliminary readings. The third time, the prism excursion is stopped before diplopia appears, the Maddox rod is inserted, and the reading again taken. Frequently, reading number one with the Maddox rod would be negative, and number two would show definite imbalance. Following this method, 192 cases were examined.

These cases were selected as having no suspicion of muscular trouble. All others were considered unsatisfactory. The refractive anomalies were corrected, showing no material changes, however, in the hyperphoria. In this number, 16.67 percent showed hyperphoria of at least 0.5 prism diopter, and 4.69 percent showed more than 0.5

prism diopter of hyperphoria by the usual Maddox rod test. When tested by the modified method suggested in this paper, 28.65 percent showed 0.5 prism diopter, or more, of hyperphoria. Hyperphoria was the least common muscular anomaly encountered, and esophoria the most common.

M. H. Post.

Aurand. **Two cases of bilateral paresis of the external recti of diphtheric origin.** Bull. Soc. d'Opht. de Lyon, 1930, v. 18, p. 83.

The author found twelve reports in the literature. Paresis of accommodation is comparatively frequent. This and mydriasis were present in the two cases reported by the author. The effect on the extrinsic muscles appeared between the fifth and sixth week after onset of the diphtheric angina.

J. B. Thomas.

Barkan, O., Barkan, H., Randal, Harvey, O., and Smith, H. Gordon. **Squint: its physiopathology and surgical treatment.** Arch. of Ophth., 1931, v. 5, May, pp. 691-703.

The authors recommend early operation to prevent impending or developing spasm of contraction and relaxation, while fusion can still be developed, and before structural changes have taken place and amblyopia has occurred. Cinch shortening according to the most recent modifications of O'Connor is a safe method for accomplishing this purpose. In the beginning, squint is dependent upon a habit spasm, that is, an impulse of contraction and relaxation, which according to Sherrington's law of reciprocal innervation is inclined to persist and to perpetuate itself. The great majority of cases are due to defective fusion and to reciprocal innervation, and neglecting to take these elements into consideration is responsible for the large number of failures in correcting these difficulties. The muscular hypothesis and the accommodation hypothesis of Donders do not in the minds of the authors offer sufficient explanation for the origin and development of all cases of squint. The cinch method of operation is especially recommended because of a better surgical principle than any previously developed, in that constriction and tension are entirely avoided, as the loops of tendon constrict the sutures and not themselves. No torsion or vertical deviation can follow. The amount of shortening can be varied, dependent upon the number of dermal sutures placed, along with the size and width of the tendon bands. There is no loss of effect at the point of shortening in the tendon and the procedure may be repeated several times if necessary.

M. H. Post.

Davidson, C., and Goodhart, P. S. **Spasmodic lateral conjugate deviation of the eyes.** Arch. Neurol. and Psychiat., 1931, v. 25, Jan., p. 87.

After a comprehensive review of the anatomy and physiology of oculogyric spasm, the authors report a case in which the clinical aspects and the pathological reports are described in detail. The outstanding features were periodic spasms of lateral deviation to the right, without turning of the head, followed by numbness of the entire right half of the body and emotional outbursts of crying. There was left homonymous, incomplete, quadrant hemianopia. The pathological lesions were multiple areas of softening in the left postcentral, parietal, angular, and supramarginal gyri. The right and left inferior occipital gyri and the right median nucleus of the thalamus were also involved in the same manner.

According to the authors, disturbances in lateral conjugate deviation of the eyes are not due to lesions in the eye muscles, the nerves, or to the primary nuclei, but to lesions of the coordinating mechanism. This mechanism has for its function the division of peripheral motor impulses.

M. E. Marcove.

Hartleib, Robert. **A new apparatus for fusing exercises in strabismus.** Klin. M. f. Augenh., 1931, v. 86, March, p. 367.

In this apparatus the actual objects are replaced by virtual images reflected

from a mirror. These are not fixed in space and may be easily moved to, from, and through one another. While the actual objects are subjectively localized by the prisms, the positions of the virtual reflected images are objectively determined independently of the observer, merely by the positions of the mirror and the objects. These can be measured and mathematically calculated and can even be utilized for determination of the angle of strabismus. With this apparatus the author succeeded in every case in obtaining fusion at the first sitting without difficulty, even in patients in whom previous attempts with the prism stereoscope had failed. *C. Zimmermann.*

Richter, A. P. **A novel stereoscopic apparatus for functional treatment of strabismus.** Klin. M. f. Augenh., 1931, v. 86, March, p. 365.

The apparatus is described and illustrated. The new feature is that from the strabismus position, by means of the once perceived fusion pictures, and through slow shifting of the half pictures, the eyes can be brought to a gradually progressive correcting and corrected position.

C. Zimmermann.

Roche, W. J. **An investigation of miners' nystagmus.** Brit. Jour. Ophth., 1931, v. 15, April, p. 211.

This investigator classifies the disease into four types: latent, subacute, acute, and neurasthenic. In the latent variety the patient may not know he has the disease. In the subacute type the patient may complain of headache, dazzling of lights, poor vision in twilight, and giddiness. The most common signs are oscillation, photophobia, and difficulty in fixing and reading. In the acute type the above indications are more marked. In the neurasthenic stage the patient has in addition various neurasthenic symptoms.

Oscillations, lid spasm, head and hand tremors, vertigo, rapid pulse, and general incoordination suggest to the author that these signs are labyrinthine in origin. With the myophoriograph the writer investigated the muscular incoordination. He found in nearly every case of nystagmus a latent squint of some type. Roche is of the opinion that deficient illumination is the primary cause of nystagmus, and that malposition at work is the principal secondary cause. His experiments, which were performed in a coal level, lead him to conclude that a four candle power lamp affords the best opportunity to use macular vision. With oil lamps or weaker electric lamps the men use peripheral vision. This endeavor to adapt peripheral vision for form vision has resulted in twenty-five per cent of such workers developing nystagmus. A study of the internal ear suggests to the writer that miners' nystagmus is a nonorganic disease in which the coordinate movements of the body, and particularly of the eyes, have become incoordinate, due to altered afferent impulses received from the eyes and the internal ear; and consequently altered reflex efferent impulses are transmitted to the musculature. These efferent impulses are altered in frequency and amplitude, and as a result the normal tone of the muscles is altered. In order to adapt the eye to bad illumination, the efferent sensations travelling to the iris sphincter and ciliary muscle are inhibited, probably the sympathetic fibers are stimulated, the stimuli producing convergence are augmented, and, as a result, the amount of nervous energy required is much increased. The peripheral visual apparatus which is being used for form vision becomes fatigued, while the oculomotor system, owing to abnormal inhibitions and stimulations, also becomes fatigued and perhaps disorganized. As a result of these altered sensations in the visual apparatus, the oculomotor system and the internal ear, the coordinating function of the posterior longitudinal bundle is very much affected.

D. F. Harbridge.

Scardapane, F. **The surgical treatment of concomitant strabismus.** Saggi di Oftalmologia, 1929, v. 8, p. 164.

The author reports the results obtained in twenty-four cases of concomitant strabismus operated upon by

Di Marzio in the Rome clinic. The cases included 3 divergent, 14 convergent, and 7 alternating convergent strabismus patients. There were 16 (62 percent) cosmetic cures. The divergent cases showed 100 percent fully corrected, the convergent cases 57 percent, and the alternating 77.5 percent. The remaining cases showed from 10 to 30 percent of undercorrection.

The method of choice was always unilateral or bilateral myectomy with capsular advancement, with or without an associated tenotomy. In only two cases were unilateral myectomy of benefit. The principle of correcting two-thirds of the deviation in the deviating and one-third in the fixing eye was used in most of the cases. Resection of 1 mm. for each three degrees of deviation was used, adding 10 degrees to the deviations under 45 degrees. Measurement was made with the perimeter.

The sixteen cosmetically cured cases showed remarkable functional results. Of the three divergent strabismus cases, two showed normal return of convergence. Two of these same cases showed a slightly limited abduction on the side of the tenotomy. The eight convergent and five alternating strabismus cases showed normal associate movements and excursion, and four of these showed improvement in vision. Binocular single vision was reestablished in five alternating and two unilateral convergent strabismus patients. Even in the cosmetically perfect subjects a residual latent heterophoria was demonstrable long after operation.

F. M. Crage.

Wiedersheim, O. **On photonystagmography.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 32.

Wiedersheim devised a photonystagmograph which is described in detail and illustrated. It fulfils all requirements by retaining the oscillatory path in form and direction, registering the amplitude, and permitting easy calculation of frequency. The curves obtained with the apparatus are reproduced. *C. Zimmermann.*

5. CONJUNCTIVA

Amias, V. **A case of sporotrichosis of the bulbar conjunctiva.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, Dec., p. 644.

Following a scratch with a chestnut twig a boy of nine years exhibited in fifteen days near the caruncle, a punched-out ulcer, irregularly outlined, deep red, and bleeding readily, with marked chemosis of the bulbar conjunctiva, with absolutely normal palpebral conjunctiva, and swelling of the preauricular gland. A week later general lymphadenitis and fever appeared, to be followed by yellowish nodules on the congested bulbar conjunctiva, without tendency to ulceration, and later a parenchymatous keratitis which ulcerated. The diagnosis was finally arrived at by a positive culture of sporotrichum Beurmanni on Sabouraud's medium. The condition responded to potassium iodide in two months. *M. Davidson.*

Bargy, M. **The antitrachoma campaign in Indo-China: what it is and what it should be.** Rev. Internat. du Trachôme, 1931, v. 8, Jan., pp. 32-46.

Bargy comments on the frequency of trachoma in Indo-China and describes the inadequacy of present measures looking toward trachoma control. He concludes that a definite program is necessary; a program based on a geographical survey of the disease with calculation of the trachoma index for the various localities. This campaign must be adequately financed, have a trained and devoted personnel, and be under competent direction. Definite results in prophylaxis cannot be expected in less than two or three generations, which is all the more reason for commencing the program immediately. *Phillips Thygeson.*

Blatt, Nikolaus. **What shall be called trachoma?** Zeit. f. Augenh., 1931, Feb., v. 73, p. 262.

The author emphasizes that benign folliculosis should be distinguished from trachoma. This is particularly necessary where treatment and segregation are compulsory, as in the army.

Benign folliculosis always heals without scars if surgery is avoided, while scarring is a sine qua non of trachoma. In folliculosis the tarsus and the cornea are never involved. In trachoma the tarsus may even be the primary seat of the lesion, the infection entering through the meibomian glands. We need not await the discovery of the etiologic agent before answering the question asked in the title. Do we not with confidence diagnose rabies, variola, and morbilli? *F. H. Haessler.*

Finnoff, W. C., and Thygeson, Phillips. **Bacterium granulosis in trachoma.** Arch. of Ophth., 1931, v. 5, April, pp. 525-557.

A minute, gram-negative, motile, rod-like bacillus which appeared similar to that described by Noguchi, under the name "Bacterium granulosis" was recovered from five out of thirteen white persons, and from one Japanese, with advanced trachoma. Numerous cases of conjunctivitis, not trachomatous in appearance, were studied with negative results. That many have failed to demonstrate the organism is probably the result of the use of unsuitable media, or attempts to cultivate it at a temperature other than thirty degrees Centigrade. Serum agglutination tests were unsatisfactory, and in only one case out of fifteen attempts was there any definite reaction. In four control cases the reactions were entirly negative.

Bacteria of similar morphological characteristics to Bacillus granulosis have been seen in and about epithelial cells in smears taken from patients with definite trachoma, and from animals having the disease produced by inoculation with Bacillus granulosis. The lesions in Macacus rhesus monkeys produced by inoculation with Bacillus granulosis are identical with those described by Noguchi and also with those produced by injection of human trachomatous material. In one monkey, infection occurred from contact. In two animals with advanced lesions these bacteria have been recovered, but no results have been obtained in a further reinjection by the bacteria recovered from these cases. The authors feel that their results confirm those of Noguchi in all essentials.

The paper is accompanied by a color plate showing the lesions produced in two of the monkeys experimented upon. Like Noguchi, in no case was there any evidence of the production of pannus, and, therefore, it may be necessary before the ultimate proof can be obtained to resort to human inoculations.

M. H. Post.

Gifford, Sanford R. **Trachoma of the American Indians.** Rev. Internat. du Trachôme, 1931, v. 8, Jan., pp. 51-52.

Gifford states that on the basis of government statistics there were 27,856 cases of trachoma among the American Indians in 1924. He quotes a medical report made during an expedition to the Rocky Mountains in the years 1819 and 1820 to the effect that a tribe of Indians, the Omawhaws, occupying part of the territory of what is now the state of Nebraska, was afflicted with an eye disease having the characteristics of trachoma. As this tribe had not been in contact with the white race or with other Indians to the east who had been with the whites, Gifford concludes that trachoma was endemic among the "red skins" before the arrival of the white race. Its possible derivation from the Mongolians who crossed the Behring Straits in their migration from Asia is still only a hypothesis.

Phillips Thygeson.

Haig, H. A. **An investigation into the serological reactions in trachoma.** Fourth annual report Giza Memorial ophthalmic laboratory, 1929, pp. 103-106.

In an effort to determine whether specific antibodies could be demonstrated in the sera of trachomatous patients, Haig applied various flocculation or precipitation tests such as the Sachs-Georgi, Kahn, and Hinton tests. Haig's antigen was prepared from trachomatous tissue derived from combined excision operations and scrapings from the lids, the material being first dried, then ground up in a mortar, extracted three times with ether, and fi-

nally the residue extracted with ninety-five percent alcohol for about seven days. The Sachs-Georgi test gave negative results in seven cases. Twenty-one sera were examined using the Kahn test; ten of these proved positive, the positive results being obtained with sera from well-established or cicatrizing cases. Most of the negative results were from incipient cases. All sera tested by the Hinton test were negative. *Phillips Thygeson.*

Junes, E. **Note on the activities of the antitrachoma service of Sfax (Tuisia).** Rev. Internat. du Trachôme, 1931, v. 8, Jan., pp. 27-32.

Junes describes the foundation and functioning of the antitrachoma service at Sfax, which consists of a dispensary and a school service. The dispensary has for its personnel one oculist, two trained nurses, several student nurses, a secretary, and a janitress. Fourteen hundred patients were treated in 1928 and one thousand in 1929. About four hundred operations were performed each year, the majority being on the lids. The procedure giving greatest satisfaction in the treatment of trachoma was the subconjunctival injection of cyanide of mercury. Diathermo-coagulation and chaulmoogra oil did not prove very effective.

The school service is under the direction of an oculist, assisted by a trained nurse; and 2,400 pupils in twelve schools are under observation. Routine examination of all children is made twice yearly. In the French schools the incidence of trachoma has been found to be about ten percent, while in the Arabian schools slightly more than fifty percent are infected. Doubtful cases are given daily treatments with zinc sulphate, and incipient cases are treated three times weekly with copper sulphate; those in the florid stage or uncomplicated by secondary infection are given appropriate treatment at the dispensary. The results have been very satisfactory. *Phillips Thygeson.*

Lavery, F. S. **The trachoma problem.** Irish Jour. Med. Science, 1930, Dec., p. 649.

This is a lengthy paper whose main purpose is to represent the nature of the trachoma problem in Ireland and to suggest methods of its solution.

M. E. Marcove.

MacCallan. **Marginal facets of Herbert and the corneal rosettes of trachoma.** Arch. d'Opht., 1931, v. 48, Feb., p. 138.

In Egypt the marginal facets of Herbert are known as Herbert's peripheral pits. They are the result of cicatrization of trachomatous follicles at the limbus and are considered important in making the diagnosis of trachoma.

M. F. Weymann.

Morax, V. **Organization of the campaign against trachoma in Algiers.** Rev. Internat. du Trachôme, 1931, v. 8, Jan., pp. 1-14.

Morax stresses the well-established familial, infantile, and preschool origin of trachomatous infection in Algiers. It is nearly always by the mother that the infants are contaminated; infection is favored by poor housing, by the absence of hygienic habits, and by certain traditional practices such as the use of kohl. School contamination plays only a very secondary part and may be almost disregarded. This is established by the fact that florid trachoma is seen predominantly in the first grades. The rôle of the mother or nurse in the transmission of trachoma is primordial. When only the father is affected contamination is the exception. It follows then that effective prophylaxis against the disease must be directed toward the family and particularly toward the young girl whose trachoma must be healed to prevent her establishing a new trachomatous focus. The ideal means would evidently consist in (1) educating the future mother by instructing her in the dangers to which she can subject her progeny and by indicating to her the simple hygienic measures which would prevent the transmission of the disease, and (2) to insure systematic treatment of her own eyes. Unfortunately, only a small percentage of indigenous girls now attend school where they can be reached, and

it is consequently of the utmost importance that measures be instituted to remedy this situation. The systematic treatment of school children would have an important prophylactic action only if a high proportion of girls attended school. However, observations made at Jerusalem have shown that the frequency and gravity of trachomatous complications are favorably influenced by methodic school treatment, combined when necessary with proper surgical measures. School treatment of trachoma should then be generalized. This would require suitable instruction of the teaching force, as only surgery would be done by oculists, the medical treatment being carried on by laymen under occasional supervision.

Phillips Thygeson.

Nogami, T. **Cultural experiments with microorganisms in trachomatous tissue.** Klin. M. f. Augenh., 1931, v. 86, March, p. 313.

Nogami describes his experiments with Ochi's microorganism in trachomatous tissue. In sera of trachoma patients diluted 160 times the agglutination was positive, in healthy individuals and other cases of conjunctivitis negative. *C. Zimmermann.*

Ochi, S. **On a kind of microorganism in trachomatous tissue.** Klin. M. f. Augenh., 1931, March, p. 309.

From trachomatous pannus Ochi found and stained microorganisms which morphologically and culturally were very similar to the pathogenic agent of epizootic lymphangitis of horses and cattle. Transmission to animals was negative, but to man positive. The microorganisms are perhaps the morbid agent of trachoma.

C. Zimmermann.

Pillat, Arnold. **The demonstration of vitamin A paucity by means of bacterioscopy of the conjunctiva.** Zeit. f. Augenh., 1931, v. 73, Feb., p. 245.

In a two-months-old child with frank keratomalacia of the left eye, the right eye (which appeared normal) had a demonstrable increase of saprophytic bacteria in the conjunctiva. The lack of vitamin A had specifically affected the epithelial system of the eye and other parts of the body. Cod-liver oil reduced the saprophytic flora of the eye. The corneal epithelium, which normally is nearly free from bacteria, showed more pathology than the conjunctival epithelium. The cells of the cornea were easily dislodged with the loupe and showed signs of degeneration. An important sign for incipient avitaminosis was the absence of lymphocytes and leukocytes despite the enormous numbers of bacteria. This showed that the author was dealing with a degenerative, and not an inflammatory lesion. The organisms present were distinctly saprophytes which multiply excessively in the degenerated cells as in a culture medium. They were not active in the production of the ocular lesion.

F. H. Haessler.

Rabinowitsch, M. **Some new operations for trachomatous complications.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 65.

The central eye hospital at Baku has a very large trachoma material, almost forty percent of the Turkish population of the surrounding villages being affected with trachoma. First the modified canthoplasty according to de Vincentiis is described and illustrated. The preferable method for entropion is enucleation of the tarsus according to Kuhnt-Straub. For entropion in incomplete trachoma of the conjunctiva and in healed trachoma of the tarsus the longitudinal tarsotomy of Warschawski is best. The author has devised a modified tarsotomy or tarsectomy and a modified tarsomarginoplasty (perhaps with transplantation of labial mucous membrane) for curing simultaneous entropion and trichiasis. It consists of excision of a longitudinal strip of tarsus with conjunctiva near the ciliary margin and its transplantation into the intermarginal incision. He had good functional and cosmetic immediate and permanent results in forty-two cases, observed for eight months.

C. Zimmermann.

Schöpfer, O. **Two cases of nevuslike lymphangioma of the conjunctiva and buccal mucous membrane.** Klin. M. f. Augenh., 1931, v. 86, March, p. 336.

In both patients, aged fifteen and twenty years, a congenital lymphangioma of the conjunctiva of amblyopic eyes occurred with an extensive lymphangioma of the homolateral mucous membrane of the mouth, transgressing the median line. As lymphangioma is regarded as a congenital malformation, it is possible that both foci originally were a unit which was separated by formation of the supramaxillary and frontal process. The diagnosis is rendered easier by the occurrence of multiple changes. The histology of lymphangioma of the conjunctiva is discussed in detail. *C. Zimmermann.*

T'ang, T. K., and Hu, C. K. **Chancre of the retrotarsal fold.** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 106.

This is a case of chancre of the retrotarsal fold in a patient who had a chancre of the penis two and a half months previously. There was an indurated bean-shaped, button-like mass which was bluish-red in color and was located in the middle portion of the upper fornix. There was a central, horizontal, linear ulceration with a scant serous exudate. Treponema pallida were found on dark field examination. The blood Wassermann was positive. Ten days after the first injection of arsphenamin the chancre healed entirely, leaving an insignificant depressed scar. *M. E. Marcove.*

Terrien, F., Fourgerot, and Hasson. **Ocular pemphigus and cutaneous grafts.** Arch. d'Opht., 1931, v. 48, April, p. 275.

A woman sixty-two years of age had suffered with pemphigus of the skin, mouth, and eye. Because she showed improvement during an attack of measles, artificial fever was produced by means of injections of bismuth, and autohemotherapy. The condition was cured, but there remained an almost complete symblepharon of both eyes. Marked photophobia and pain were present. Under general anesthesia cutaneous grafts were placed to form new conjunctival sacs, first in one eye, and later in the other. This was followed by gradual relief of pain and photophobia with the acquisition of reading vision. *M. F. Weymann.*

Tomas Blanco. **Corneal complications of vernal catarrh of Saemisch.** Arch. de Oft. Hisp.-Amer., 1931, v. 31, Jan., p. 25.

Pathologically descriptive of this strange disease is the name "periodic hyperplastic conjunctivitis" as proposed by Wicherkievicz, although neither inflammation nor catarrh are, properly speaking, a part of the symptom complex. The corneal changes in the disease have been neglected by writers, and two cases of vernal catarrh with corneal lesions in boys of five and twelve years of age respectively are described by the author. Both exhibited bilaterally an arched band of infiltration concentric with the upper limbus and separated from it by clear cornea, strikingly similar to an arcus senilis, and ending in one eye in a superficial ulcer poorly staining with toluidine blue. In both cases the remainder of each cornea was cloudy, the bulbar conjunctivas were pale, and the tarsal conjunctivas showed the typical changes. The pain was insignificant, and the main symptoms were those of photophobia and epiphora. The blood count was 14,500 leucocytes with eleven percent eosinophiles. The pharynx showed no adenoids in one case and abundant adenoid vegetations in the other. The dominant corneal pathology was epithelial degeneration leading to a pulverulent desquamation.

A review of the literature shows the following corneal changes described: (1) primary superficial: invasion of cornea from limbus by a gelatiniform lesion, Trantas white spots, epithelial pulverulent proliferation, small papular lesions, and pannus; (2) primary interstitial: parenchymatous infiltration, keratitis punctata profunda, total sclerosing keratitis, parenchymatous arciform infiltration or pseudogerontoxon, elimination ulcers, and marginal dys-

trophy; and (3) sequelæ: opacities, irregular astigmatism, and keratoconus.
M. Davidson.

Wachendorff. **Argyrosis after targesin.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 81.

To the two cases of argyrosis after targesin already published, Wachendorff adds another in a patient affected with conjunctivitis and occasional keratitis from lagophthalmos, due to an old paresis of the facial nerve, who showed dark argyrosis after using targesin for four months. *C. Zimmermann.*

Wilson, R. P. **Accidental infection with trachoma.** Fourth annual report Giza Memorial ophthalmic laboratory, 1929, pp. 58-59.

A case of accidental infection of an ophthalmic surgeon with trachoma is recorded. While expressing the conjunctiva of a patient with florid trachoma some of the material splashed up into his right eye. The eye was immediately irrigated with antiseptic solutions, but two days later there was slight discharge and on the fourth day the palpebral conjunctiva was acutely congested and the vessels at the upper limbus were slightly injected. By the eighth day some very tiny follicles had appeared near the upper border of the upper tarsus which was swollen and deeply congested. The bulbar conjunctiva was also slightly congested. On the eighteenth day many stage one, T.1. (incipient trachoma, MacCallan's classification) follicles were visible over the tarsus but particularly near the upper edge. The palpebral conjunctiva was finely granular and very acutely inflamed, while the conjunctiva of the upper limbus was also edematous and congested. In spite of all possible precautions being taken the left eye became involved about the twenty-fourth day and progressed typically. Active treatment was instituted for both eyes, curettage being performed twice and the copper stick used energetically as well as chaulmoogra oil, which seemed to give the most benefit. When seen ten months later there was still present chronic congestion of the tarsal conjunctiva of both eyes, fine cicatrices, and a few follicles in process of cicatrization. Neither cornea had developed trachomatous changes, the lack of which is extremely rare in Egyptian trachoma.
Phillips Thygeson.

Wilson, R. P. **Experimental inoculations with Bacterium granulosis (Noguchi).** Fourth annual report Giza Memorial ophthalmic laboratory, 1929, pp. 67-69.

Wilson inoculated seven monkeys (three Macacus rhesus, one Cercopithecus aethiops, three Macacus sinicus) with cultures of Bacterium granulosis obtained from the Rockefeller Institute. All developed a slight congestive reaction following the inoculation, which rapidly disappeared. Nearly all of the animals also developed one or more scattered translucent follicles. When the animals were examined very carefully with the loupe, pin-point follicles were visible along the upper edge of the tarsus, but there was an entire absence of all inflammatory signs in the conjunctivas.

The conjunctiva of a blind human eye, which had traces of a healed trachomatous infection, was also inoculated with Bacterium granulosis. The patient was watched for a period of two months, but absolutely no signs of recurrence of the disease appeared. Other inoculations of healthy human conjunctivæ have been made but the final results are not stated.
Phillips Thygeson.

Wilson, R. P. **Folliculosis of the conjunctiva in animals.** Fourth annual report Giza Memorial ophthalmic laboratory, 1929, pp. 63-64.

Monkeys and apes may suffer naturally from a follicular condition of the conjunctiva; therefore, in conducting animal experiments it is important to bear this fact constantly in mind. The condition is characterized by the presence of hard, well-defined, semitranslucent follicles especially at the outer and inner angles of the upper tarsus and also in both fornices; such follicles have never been observed to rupture spon-

taneously. They are always freely movable over the subconjunctival tissue, but never occur on the conjunctiva of the tarsus, although it is not uncommon to find very small follicles along the upper edge of the tarsus of the upper lid. These follicles may often be missed if the conjunctiva is not examined with a corneal loupe. The conjunctiva is in some cases absolutely devoid of signs of inflammation, but in others slight congestion of the conjunctival vessels may be present. With regard to the follicles themselves it is of the greatest importance to note whether they rupture spontaneously or are expressible, for it is this feature which distinguishes the follicles of trachoma from those of other follicular diseases of the conjunctiva. Folliculosis of monkeys may vary in appearance from time to time without treatment. Follicles may appear spontaneously on a healthy conjunctiva and, inversely, a conjunctiva with marked folliculosis may clear spontaneously without residue. In several instances it has been possible to observe the course of a natural folliculosis over a period of three years, and in none of these cases have cicatrices or pannus developed. As regards etiology of this natural condition it is not necessary to insist on a microbic cause, as it has been possible to induce follicles in rabbits and monkeys by mere irritation and trauma. *Phillips Thygeson.*

Wilson, R. P., and El-Kirdani, A. L. **Ophthalmic survey of the village of Bahtim.** Fourth annual report Giza Memorial ophthalmic laboratory, 1929, pp. 71-86. (See Section 18, Hygiene, sociology, education, and history.)

Zubak, Matthew F. C. **Electrocoagulation of pterygia.** Arch. of Ophth., 1931, v. 5, May, pp. 732-733.

Using a machine recommended for electrocoagulation, fulguration and electrical diathermy, the author has found that pterygia may be coagulated in such a manner as to produce sloughing of the pterygia. Seven cases in all have been operated upon by this method. *M. H. Post.*

6. CORNEA AND SCLERA

Bückler, Max. **Sickle-shaped changes of the corneal epithelium, a new slit-lamp finding.** Klin. M. f. Augenh., 1931, v. 86, Feb., p. 164.

The changes observed in a woman aged fifty-one years, who complained of burning in the eyes, consisted in numerous very small only microscopically visible sickle-shaped defects of the superficial epithelial stratum. The sharp convex side was distinguished from the concave side, which was formed by a belt of minute droplets. These disappeared without traces, while new ones occurred in areas so far free. Vision was not influenced by them. The cause is not known. *C. Zimmermann.*

Chang, S. P. **A contribution to radium treatment in ophthalmology (corneal fistula and retinitis proliferans).** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 81. (See Section 2, Therapeutics and operations.)

Elschnig, A. **Extraction of senile cataract within the capsule in keratoconus.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 79. (See Section 9, Crystalline lens.)

Fischer, F. P. **Permeability of the cornea to alkaloids.** Arch. f. Augenh., 1931, v. 104, May, pp. 121-133.

Fischer measured the permeability of the cornea to the nitrate salts of atropin, pilocarpin, eserin and scopolamin. The degree of absorption was determined by measuring the concentration of nitrate ions in the aqueous. With atropin and eserin, it was found the stronger the alkalinity and concentration the greater the absorption. Increasing the concentration of the pilocarpin and the alkalinity of the scopolamin increased the absorption.
Frederick C. Cordes.

Kukán, F., and Koczkás, J. **Chalcosis and spectroscopy of the cornea.** Klin. M. f. Augenh., 1931, v. 86, Feb., p. 195.

A man aged sixty years, who had for twenty years treated his eyes twice daily with copper sulphate for trachoma, showed in the greenish cornea of each eye, from 3 to 1.50 mm. distant

from the limbus above and below, a sharply defined brown crescent from 3 to 4 mm. wide, consisting, as seen with the slit-lamp, of very fine granules of metallic luster. Iris and lens were not changed and vision was only slightly impaired. Spectroscopically the absorption by the cornea corresponded to that of a weak copper solution. Under treatment with dionin and iodol salve vision was improved. *C. Zimmermann.*

MacCallan. **Marginal facets of Herbert and the corneal rosettes of trachoma.** Arch. d'Opht., 1931, v. 48, Feb., p. 139. (See Section 5, Conjunctiva.)

Puscariu, E. **Deep pustuliform keratitis (Fuchs) in a case of congenital syphilis.** Ann. d'Ocul., 1931, v. 168, April, pp. 243-254.

The case reported is that of a fifteen-year-old syphilitic girl with bilateral corneal involvement. After atropin and dionin applied locally and bismuth for general treatment the symptoms disappeared leaving slight evidence in the cornea. The literature is reviewed, and the relationship to chronic diseases, especially syphilis, is pointed out.

H. Rommel Hildreth.

Soudakoff, P. S. **Further observation on tattooing the cornea with gold chloride (Knapp's method).** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 75.

The author reports thirty cases of tattooing of the cornea, fifteen of which were tattooed by Knapp's original method of gold chloride solution and a one percent solution of tannin; the other fifteen cases with a solution of gold chloride and a two percent solution of hydrazine hydrate. In the first group the percentage of freshly prepared gold chloride varied from three to five percent, mostly the three percent solution; in the second group a three percent solution of gold chloride was used exclusively. The results obtained were good in sixty percent of the cases in group one and fifty-three percent in group two. A satisfactory result was obtained in twenty-seven percent in the first group and twenty percent in the second. Failure was recorded in thirteen percent in the first group and twenty-seven percent in the second. In five cases of each group there was a moderate irritation of the eyeball following operation, which the author states is due to the free hydrochloric acid present in the gold chloride. For this reason, the gold chloride is approximately neutralized before use.

Six of the cases were under observation for a period of five to eighteen months. Of these six the metallic deposits disappeared in two cases and in the remaining four the cosmetic result was good. Slit-lamp examination showed numerous particles of gold deposited in the anterior third of the corneal stroma, which appeared brown by indirect illumination and brownish red by direct illumination. The change of color from black to red is due to transformation of metallic gold into colloidal gold.

The author gives the following precautions to achieve successful tattooing: (1) The solution of gold chloride should not be over six weeks old. (2) the solution of hydrazine hydrate should be fresh and should be kept in a bottle the inside of which is coated with paraffin. (3) The epithelium should be scraped off under the control of fluorescein staining. (4) The tattooed area should be marked with a trephine. (5) As much as possible of the corneal scar should be removed.

M. E. Marcove.

Tomas Blanco. **Corneal complications of vernal catarrh of Saemisch.** Arch. de Oft. Hisp.-Amer., 1931, v. 31, Jan., p. 25. (See Section 5, Conjunctiva.)

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Adamantiades, B. **A case of relapsing iritis with hypopyon.** Ann. d'Ocul., 1931, v. 168, April, pp. 271-278.

The case of a twenty-year-old male was followed for over a year. Repeated attacks of iritis with hypopyon occurred, finally destroying one eye and resulting in atrophy in the other. The Wassermann reaction was always negative and antisyphilitic treatment was without results. Tuberculosis was not

found. An ulcerative skin condition of the scrotum and legs was present. A positive blood culture of staphylococcus was found and was thought to be responsible for the iritis, although the hypopyon was sterile.

H. Rommel Hildreth.

Batten, Rayner D. **Angioid streaks, and their relation to a form of central choroidal disease.** Brit. Jour. Ophth., 1931, v. 15, May, p. 279.

The author of this contribution reviews four case records of his own patients, three of whom were blood relatives, together with a review of six additional reported cases. They are illustrated by nineteen drawings and two colored plates. He concludes that this choroidal disease has its onset at about forty years of age. It is not associated with any syphilitic, tuberculous, or septic cause, and is not inflammatory in origin, but primarily a vascular disease. It is probably an inherited disease, and often familial. It affects both eyes. The earlier symptoms are a pallor surrounding the optic disc, fine pigment changes at the macula and central area, and angioid streaks, without necessarily any loss of vision. The later symptoms are central macular hemorrhages and exudation, associated with retinitis circinata. These in turn tend to absorption, giving rise to extensive choroidal atrophy, with scattered gross pigmentation, and later still to retinitis proliferans. The same choroidal disease occurs without angioid streaks. If the association of angioid streaks with this form of choroidal disease be considered established, the prognosis in cases showing angioid streaks should be very guarded even where there are full vision and no symptoms. They may exist for many years before any central hemorrhage occurs.

D. F. Harbridge.

Delaney, Jas. H. **Sympathetic ophthalmia.** Arch. of Ophth., 1931, v. 5, May, pp. 781-783.

A case is reported of a child nine years old, who was struck in the right eye with an icy snowball on November 23, 1929. Six days later a marked degree of traumatic uveitis was present. On January eleventh the patient was discharged, being warned that further trouble might result. He returned on August 15, 1930, with recurrence of symptoms in the right eye, and slight pericorneal congestion in the left eye, with some fine deposits on the posterior surface of the cornea and other signs of uveitis. The right eye was enucleated at once. A diagnosis was made at the Army Medical Museum of trauma, partial dislocation of the lens, secondary iritis, secondary glaucoma, and recurrent secondary uveitis. With correction the vision remained 20/20 in the left eye. In order to exclude the coincidental inflammation in the left eye all possible sources of focal infection were studied but with negative results.

M. H. Post.

Del Duca, M. **Radiologic diagnosis of ossification of the choroid.** Saggi di Oftalmologia, 1929, v. 5, p. 547.

The diagnosis of ossification of the bulb in general and of the choroid in particular is at times impossible on clinical examination. The x-ray makes the diagnosis a certainty and the best position for exact visualization is the occipitobuccal. Lateral views are of importance in serving for precise localization.

Radiographs of cases of phthisis bulbi and bulbar atrophy were made to demonstrate the facility of diagnosis of this condition.

F. M. Crage.

Fleischer, Bruno. **Is there an isolated sympathetic chorioretinitis?** Klin. M. f. Augenh., 1931, v. 86, Feb., p. 183.

The participation of the choroid in the form of small round light or pigmented foci is not infrequently determinable if the periphery of the fundus is still visible; and in severe cases, in which because of the alterations in the anterior segment an ophthalmoscopic view is not possible, an affection of the choroid, retina, and optic nerve may be assumed. The occurrence of an isolated choroiditis is much rarer. In 1930 Fleischer examined a patient whose right eye had been injured in 1909 by a piece of iron. As the sideroscope

showed, this had remained in the eye, which presented a recurrent mild chronic iridocyclitis. In the left eye was a peripheral choroiditis with sharply defined round foci, as occasionally seen in sympathetic iridocyclitis. As no other cause was to be found the condition had to be considered as probably sympathetic. *C. Zimmermann.*

Kikai, K. **Influence of various procedures on barrier between blood and aqueous. (Blutkammerwasserscheide).** Arch. f. Augenh., 1931, v. 104, May, pp. 134-153.

The author used fluorescein and eosin intravenously to determine the influence of various procedures on the barrier between intraocular capillaries and aqueous. The experiments were carried out on rabbits. Resection of the cervical sympathetic increased the permeability of the capillaries as did theophyllin, eserin, pilocarpin and the subconjunctival injection of sodium chloride. Calcium, atropin, scopolamin, levoglaucosan and adrenalin reduced the permeability. Aminoglaucosan apparently had no influence.

Frederick C. Cordes.

Koyanagi, Y. **Further remarks on pathogenetic changes of the choroidal vessels in nephritic retinitis.** Klin. M. f. Augenh., 1931, v. 86, Feb., p. 145.

From former anatomical investigations Koyanagi concluded that with great probability severe alterations of the choroidal vessels with considerable disturbances of circulation and subsequent venous stasis were responsible for the development of nephritic changes in the retina. Contrary to A. Fuchs, who usually found the albuminuric vascular changes of the choroid in the periphery of the fundus, Koyanagi in his eight carefully examined cases demonstrated them regularly in the central area, as illustrated by his photomicrographs, in which the ophthalmoscopic nephritic changes of the retina are the most striking. Like these the nephritic changes of the choroidal vessels do not occur in spots, but are diffuse. In agreement with most authors he believes that the stellate figure at the macula is essentially a characteristic grouping of fatty granular cells chiefly in the intermediate granular layer. The occurrence of pigment epithelial fatty granular cells is with great probability to be attributed to disturbed nutrition of the retinal pigment layer by choroidal vascular alteration. The clinical and histological aspect of the retina in nephritic retinitis finds, according to the author, a very satisfactory explanation in assumption of a preceding affection of the choroid, and the designation "nephritic chorioretinitis" for the ocular affection in kidney diseases is justified.

C. Zimmermann.

Linksz, A. **The influence of the sympathetic on the permeability of the bloodvessels of the eye.** Arch. f. Augenh., 1931, v. 104, May, pp. 264-323.

Linksz did a great deal of experimental work on the influence of the sympathetic on the blood vessels of the eye. The paper does not lend itself to abstracting and only a few of his important conclusions can be enumerated.

(1) Faradic stimulation of the cervical sympathetic retards the passing of fluorescein into the anterior chamber and paralyzes the effect of parasympathetic stimulation. (2) After a shunting-off (ausschaltung) of the sympathetic enervation, the albumin content of the aqueous is increased. If the superior cervical ganglion is extirpated, the increase of the albumin is greater than in simple resection of the nerve. (3) At a considerable interval after severance of the sympathetic, the albumin content of the aqueous drops to below normal. (4) During the first twenty-four hours after resection, the time appearance of fluorescein is hastened. Ehrlich's line also appears sooner than in the normal eye. After four days, however, its appearance is considerably retarded. (5) The albumin content of the aqueous in the second puncture is higher than in the normal eye. After two to four days, the albumin content is lower than in the control. (6) On the side of the severed sympathetic, the initial increase in intraocular tension following puncture

occurs sooner and is higher than in the normal eye. The subsequent hypotension also develops sooner and reaches a lower degree. The final return to normal tension is slower than in the control eye. (7) Where resection of the sympathetic has existed for some time, the resorption of subconjunctivally injected specific serum is slower than in the normal eye.

Frederick C. Cordes.

Sallmann, L. **Air insufflation into the anterior chamber.** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 6.

The author has demonstrated that by means of air insufflation into the anterior chamber it is possible to break through the selective retaining power of the endothelium, and to produce an increased permeability of the capillaries.

Rabbits were used for these experiments. After injecting intravenously 0.025 gm. per kilogram of animal weight of one percent solution of fluorescein, the aqueous was withdrawn and was replaced by air filling the entire chamber. At two fifteen-minute intervals, and then at hourly intervals, the eye was examined with a slit-lamp, and a comparison was made of the aqueous color with the color of solutions of known concentration.

It was found that without air insufflation the duration staining of the aqueous by fluorescein averaged four hours. After inflation with air, the duration of the staining lasted for six days, even when all symptoms of irritation had disappeared and the air bubble was completely resorbed.

M. E. Marcove.

Sédan, **J. Iritis and familial hemophilia.** Ann. d'Ocul., 1931, v. 168, April, pp. 264-271.

Two cases in separate families are reported of unilateral iritis occurring after trivial injuries to parts other than ocular with development of hematoma. The author suggests absorption of the hematoma as causative.

H. Rommel Hildreth.

Soudakoff, P. **Fatty degeneration of the anterior segment of the eyeball (xanthomatosis bulbi).** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 86.

In an eye injured fifteen years previously by an explosion following which the vision became nil, there appeared in the lower half of the anterior chamber and on the posterior surface of the cornea large yellow masses suggesting xanthomatosis bulbi. Because of chronic iridocyclitis with pain the eye was removed, and it was sectioned. Microscopic examination showed the peripheral part of the anterior chamber to be filled with a new-formed connective tissue which extended from the filtration angle to the pupillary border of the iris, and partially covered the anterior capsule of the lens. Special staining with Sudan III and scarlet red revealed the presence of fat in the sclera, iris, and cilliary body and in the connective tissue membrane of the anterior chamber. In all of these tissues fat was found in the form of droplets of various sizes, partly phagocytized and partly free in the tissues.

M. E. Marcove.

Szasz, A. **The influence of medication on the albumin content of the aqueous.** Arch. f. Augenh., 1931, v. 104, May, pp. 167-176.

This report is based on the work done on reactive hypertension. The average albumin content of the original aqueous was 0.0497 percent; the reformed, 3.172 percent. With the use of pilocarpin, eserin, and arekolin, the albumin content was increased. It was influenced by pelletierin. Yohimbin had the tendency to produce a reduction in the albumin content.

Frederick C. Cordes.

Tutui, Yosimito. **The influence of the blood status on the aqueous.** Arch. f. Augenh., 1931, v. 104, May, pp. 110-120.

The intravenous injection of water, salt solution, colloidal suspensions, or dyes produced no change in the specific gravity or refractive index of the serum ultrafiltrate on the aqueous. This was constant even though sufficient was injected to produce the death of the experimental animal. Tutui concludes that, as was pointed out by Hertel in

1914, the bloodvessel wall cells are probably the regulating factor.

Frederick C. Cordes.

Vancea, P. **Is there an iris symptom complex characteristic of tabes and paresis?** Zeit. f. Augenh., 1931, v. 73, Feb., p. 254.

Tieri has described a triad of iris manifestations which he considers characteristic of tabes, namely, atrophy of the iris, irregular contour of the pupil, and anisocoria. Of twenty-eight patients examined by the author eight had the first of these manifestations, four the second, and thirteen the third. In no one was the entire triad present, and only three had two of the symptoms. The author, therefore, concludes that this morphologic triad does not exist.

F. H. Haessler.

Willard, H. **The evolutionary characteristics of sympathetic ophthalmia which terminates by cure.** Arch. d'Opht., 1931, v. 48, March, p. 197.

Three cases of sympathetic ophthalmia which terminated in cure are described in detail. One characteristic of all three cases was the recurrence of an iritis two or three times after apparent cure from the initial attack. The writer considers these recurrences as characteristic of the evolution of cases of sympathetic ophthalmia which eventually become cured, and the patient should be warned that such attacks will occur, but that the ultimate prognosis is good. The quiet intervals between the recurrences may be a year or more.

M. F. Weymann.

8. GLAUCOMA AND OCULAR TENSION

Coppez, Jean. **Iridocyclitis with hypertension.** Bull. Soc. Belge d'Opht., 1930, no. 61, p. 67.

The writer presents two cases to demonstrate that severe and long continued iridocyclitis may tolerate a mydriatic. Also three cases in which hypertension appeared rapidly and made treatment difficult. In one of these latter cases an iridectomy, possibly followed by slight filtration, brought about a permanent cure. In another the return of glaucomatous symptoms a year after iridectomy led the way to a successful sclerectomy. In another a simple sclerectomy was successful.

The author summarizes as follows: In this affection an infectious etiology is rarely proven. The symptom of hypertension causes the most damage and must be relieved. Concentrated adrenalin or glaucosan should be tried but one should perform a sclerectomy to gain time and save the sight.

J. B. Thomas.

Guist, G. **Arterial hypertension and the eye.** Zeit. f. Augenh., 1931, Feb., v. 73, p. 232.

The author discusses the importance of tortuosity of the retinal veins in the diagnosis of hypertension. The factors which produce the tortuosity can be demonstrated with rubber tubes. If water is allowed to flow gently through a rubber tube, the tube takes its natural form, that is, it approaches a straight line. As the pressure is increased, the radius of curvature becomes smaller. At the point where the rubber tube meets its rigid feeder it becomes bulbously dilated. The tortuosity depends on the pressure of the fluid, the lumen of the tube, the material and thickness of the wall, and the consistence of the fluid. These principles can be applied to human bloodvessels, as is shown by simple injection experiments on cadavers. The balance of these components is responsible for the arrangement of retinal vessels into a form which ophthalmologists constantly see and describe as the normal course of retinal vessels. When the blood pressure becomes increased the course of the vessels becomes changed.

The fact that the ophthalmoscopic pictures of primary and toxogenic hypertension are different depends on the character of the vessel wall in the two conditions. In primary hypertension the large arteries have a normal course, in advanced cases they may be slightly narrowed, have accompanying white stripes, or be slightly curved here and there. The smaller arteries when visible are unchanged, but usually are so much thinned as to be invisible. The

large veins are unchanged in early cases, the smaller veins are corkscrew-like. In advanced cases the large veins are moderately tortuous and slightly increased in caliber. The smaller veins are still more tortuous but always larger in caliber. At the root of the vein there is a bulbous swelling. The crossing phenomenon of Gunn is always present. The presence of choked disc, star at the macula, and retinal hemorrhage is of secondary importance for the diagnosis. In toxonephric hypertension the larger arteries almost always have accompanying white stripes which correspond to a thickening of the wall. The lumen is decreased so that the vessel seems very thin. The smaller arteries are barely visible. The large and small vessels are equally tortuous, but the waves have a large radius of curvature, never being corkscrew-like. The essential point in diagnosis is the curvature of the veins, and the point is readily understood in view of the histological picture. In the retina of a patient with primary hypertension the media of the arteries are tremendously thickened with hyalin changes; the venous walls are only moderately thickened and the thickening depends on a moderate cellular increase in the adventitia. In the retina of a patient with uremia resulting from a secondary contracted kidney, veins and arteries are both so much thickened that they are indistinguishable from one onother, and displace the inner granular layer of the retina. For this reason arterioles and venules may be equally tortuous, or if the blood pressure is insufficient to bring about tortuosity in these thick-walled, stiff tubes, the accompanying white strips will dominate the retinal picture. *F. H. Haessler.*

Marx, E. **Simultaneous registration of the intraocular pressure and the spinal fluid pressure.** Ann. d'Ocul., 1931, v. 168, Feb., pp. 125-137.

This is the second article published under the same title. After the intravenous injections of different substances a simultaneous change in the intraocular and spinal fluid pressure is always found. The degree of change is not always equal, a fact which the author attributes to a special reaction of the smooth muscle in the eye to certain substances. Extracts from muscle, thyroid tissue, placenta, ovary, thymus, liver, breast, testicle and acetylcholine lowered the pressure. Adrenalin and pituitrin alone increased the pressure. The changes in these two systems nearly always paralleled arterial blood pressure changes. Increasing the quantity of substance injected increased the change in pressure but not in proportion. *H. Rommel Hildreth.*

Pi, H. T. **Hydrophthalmos in relation to nevus and glaucoma.** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 95. (See Section 13, Eyeball and orbit.)

Ratschewsky, P. A. **On the tension of the cornea.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 39.

The tonometer of Schiøtz is based on a definite radius of curvature of the cornea, whereas this value varies in the human eye. This is not so essential as the fact that Schiøtz ignored the thickness of the cornea. The theoretical investigations of the author for the first time emphasize the great importance of the radius of curvature of the cornea and especially of its thickness for ascertaining the results of tonometry. The tensions of the cornea which represent the forces participating in counteraction of the deformation, as shown by the formulas developed by the author, depend upon the radius of curvature and the thickness of the cornea. Although the experimental part is not finished, the author feels justified in asserting that his curve permits of finding with the tonometer of Maklakow almost correct values of intraocular tension of eyes whose radius of curvature and corneal thickness do not essentially differ from those observed in his experimental eye. *C. Zimmermann.*

Walker, Clifford B. **Trephine operation.** Arch. of Ophth., 1931, v. 5, April, pp. 517-526.

There are two possible explanations for the varying results following ap-

parently satisfactory trephine operations for glaucoma; one lies in the pressure on the eyeball and the resultant unnecessary injury to the iris, the zonule, and the ciliary region; the second is the possible introduction of foreign matter into the wound, this foreign matter having lodged in the hollow shaft of the trephine. In an effort to eliminate these causes of trouble, the author has constructed a trephine which consists of a solid shaft which is drilled out for about 8 mm. and the lateral walls removed on two sides from a distance of 1.25 or 1.5 mm. above the cutting edge up to the solid shaft, leaving only a sufficient portion to insure ample rigidity, the window openings 1.25 to 1.5 mm. from the cutting edge of the drill acting as a gauge for the depth of the trephining. These openings permit of a special suture of the author's design being placed through the portion of the cornea and sclera outlined by the first movements of the trephine.

A less expensive trephine, accomplishing somewhat the same purposes, can be made by removing one of the lateral walls only, but such an instrument is not quite as satisfactory as that with the double windows. Careful instructions are given for cleaning and sharpening these trephines.

M. H. Post.

Weekers, L., and Hubin, R. **Results obtained by incarceration of the iris in glaucoma.** Arch. d'Opht., 1931, v. 48, March, p. 186.

A modified technique is used consisting of dissection of the conjunctival flap with scissors and making the scleral incision with a cataract knife from without inward. The iris is not incised if it remains readily in place. The tabular results in a series of fifty cases are given. In general this type of operation yields the most favorable end results in that the ultimate tension is from 15 to 20 mm. It is thought that the hypotony so produced is of benefit in maintaining the nutrition of the damaged tissues.

M. F. Weymann.

9. CRYSTALLINE LENS

Arruga, H. **Intracapsular extraction of cataract.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, Nov., p. 593.

Extracapsular extraction, in spite of its disadvantages, has been used for generations, and its technique has reached a high stage of perfection. The intracapsular method eliminates those disadvantages and its technique will be perfected with continued use. A historical review of the method, accompanied by illustrations of instruments and procedures, shows present-day reversion to early methods, those of Daviel and Dichter. A study of the literature dealing with intracapsular extraction shows in the opinion of Arruga that this operation offers few difficulties to trained ophthalmologists, and gives good and substantially uniform results in different hands. In the past three years 204 cases have been operated upon by the Stanculeanu-Török procedure. It is successful in two-thirds of the cases, but, since Arruga applies it to his cases without selection, in a tabulation of cases on the basis of suitability four-fifths of the cases would be successful. He has had five vitreous prolapses, three iris prolapses, two cases of postoperative iridocyclitis in myopes, upward displacement of the pupil in twelve cases, four retinal detachments in myopes, and four choroidal detachments. He has no glaucomas, expulsive hemorrhages, or infections to report. The relation of the retinal detachments to the method is not clear. The pupillary displacements have only a cosmetic significance, and no visual disturbances of consequence resulted from the choroidal detachments. The Elschnig forceps as modified by Meesmann is used. The method is more suitable in the aged, because of greater fragility of the zonule, and is inappropriate in intumescent and hypermature cataracts, because of difficulty in grasping the capsule and the tendency of the capsule to break in passage through the incision, and on account of greater zonular resistance. The method as practiced by Arruga is given in minute detail and is well illustrated;

and he recommends it as the procedure of choice at present. *M. Davidson.*

Branbergen, R. T. **Cataract after thyroidectomy.** Arch. d'Opht., 1931, v. 48, Feb., p. 120.

A thirty-four-year-old woman underwent thyroidectomy in 1924, after which extensive spasms occurred, which were controlled with calcium. In 1929 a thin layer of opacities, containing numerous varicolored crystals, was discovered under the capsule of each lens. By 1930 increased density of the opacities rendered operation necessary. This was successfully done without complications. A review of the subject is given.

M. F. Weymann.

Busacca, A. **Surgery of iris prolapse after simple cataract extraction (dialysis of the prolapse).** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 76.

A technique is described which proved successful in three cases. The nasal angle of the wound was reopened with a spatula and a small iridectomy performed. Then the temporal angle was opened, an iridectomy forceps introduced to the coloboma, and its upper end grasped tearing the whole prolapse out of the wound, where it was abcised. The operation in the third case was somewhat modified.

C. Zimmermann.

Elschnig, A. **Extraction of senile cataract within the capsule in keratoconus.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 79.

The operation and the course of healing were perfectly normal, with strikingly good vision of the eye affected with intense keratoconus.

C. Zimmermann.

Gualdi, V. **Clinical contribution and biomicroscopic study of radium and roentgen ray cataract.** Ann. di Ottal., 1930, v. 58, Dec., p., 1057.

About fifty cases have been reported in which either radium or the roentgen ray in therapeutic doses has caused permanent opacity of the crystalline lens. Such studies are important in determining the doses that are within the limits of safety. The author describes two cases of bilateral cataract developed in young subjects and which he attributes wholly to the effects of radium and x-rays exhibited in therapeutic doses.

The period of latency was between three and four months. The soft roentgen rays appeared to be more destructive of the lens tissue than the hard. The opacity developed in the posterior pole of the lens, delimited by the cortex, in the form of a biconvex axial disc; the anterior portion of the lens remaining clear. The capsule did not become affected. *Park Lewis.*

Hippel, E. **Embryological observations in the dog on the inheritance of congenital cataract, on lamellar cataract, and on a special form of capsular cataract.** Graefe's Arch., 1930, v. 124, p. 300.

A male and female shepherd dog, members of the same litter, had an atypical form of lamellar cataract in each eye. When this pair were bred together there were produced in two litters eleven young of which nine had cataract. The same male with a normal female produced in three litters fifteen offspring of which two had cataract. The original female mated with a normal male bore six young of which five had cataract. Thus, for these relatively small numbers, it could be said that the cataract was a dominant characteristic and was inherited according to Mendel's laws. So as to find out in which stage of development the morphological deviation ending in incipient cataract occurred, microscopic examination of embryonic eyes from these dogs was made. Studies on embryos 30, 36 and 41 days old showed in three out of five of one litter thirty-six days old, and in two out of four of another litter forty-one days old, large oval or circular clear spaces confined pretty exclusively to the anterior half of the embryonic lens. These spaces were probably due to swelling up and bursting of individual lens fibers. Neighboring lens fibers later became involved in the liquefaction or cataract changes. The primary

cataract change is referred to by the author as an "idiokinetic" one in which scattered groups of lenticular epithelial cells, after growing out into fibers, had an inherited tendency to degenerate. The secondary involvement of neighboring lens fibers he calls a "peristatic" cataract. In these dogs there was apparent no general diathesis such as rickets. Noteworthy changes occurred in the lens capsule. The thickness of the anterior capsule varied between seventeen micra in dogs one to two months old and 150 micra in a dog seven years old. Within the capsule and always close to its anterior surface there were observed in five of these dogs homogeneous lumpy deposits of quite irregular shape staining strongly with hemotoxylin. These lumps might be found breaking through the capsule superficially, or posteriorly into the lens substance. The author can give no explanation of these capsular changes.

H. D. Lamb.

Müller, Otto. **The frequency and form of anterior axial raphe punctation of the lens and anterior axial embryonic cataract.** Graefe's Arch., 1930, v. 124, p. 444.

By observation with the slit-lamp, anterior axial raphe punctation of the lens was found to consist of very fine dots of opacity arranged in bands along the limbs of the anterior stellate lens-figure. These dots were located in most cases directly subcapsularly, more rarely several were found deeper in the superficial cortex. Of 127 individuals between 50 and 100 years old, 22, or 17.2 percent, showed this lens opacity. The youngest person showing this cataract was forty-four years old and beyond this age the frequency of the change varied directly with the increasing number of years. From these findings, anterior axial raphe punctation of the lens should be considered as a special form of incipient senile cataract.

Anterior axial embryonic cataract was congenital and usually consisted of small intensively white glistening dots and lines located at about the same level in the neighborhood of the anterior Y raphe of the embryonic nucleus. Among 267 individuals of different ages, 55, or 20.6 percent, had this anterior axial embryonic cataract.

The vision was not found to be disturbed by either of these forms of lens change.

H. D. Lamb.

O'Malley, C. C. **Intracapsular cataract extraction at Moga, Punjab.** Brit. Jour. Ophth., 1931, v. 15, March, p. 152.

This contribution discusses the procedure as carried out by Mathra Das. The essential point of difference from formerly described methods is that no counterpressure is made. The lens is tumbled and delivered with a strabismus hook. The author tabulates his results in 220 operations under Das. A discussion of the social condition of cataract patients in India, of cataract patients with all kinds of complications operated upon, and of the fact that no subsequent record is obtained is set forth in the contribution. The author concludes with the statement that "there is no reason why this operation should not become a success with European surgeons." A commentator makes the pertinent remark that "East is East and West is West."

D. F. Harbridge.

Salit, P. W. **Chemical studies of lipids of normal animal lenses, cataractous human lenses, and the blood of patients with cataract.** Arch. of Ophth., 1931, v. 5, March, pp. 354-361.

Many investigators have found increased lipids in cataractous lenses. Cholesterol, because of its characteristic crystalline structure, is that most frequently noted. Myelin has also been found by many observers; lecithin less frequently. Cholesterol varies from 0.62 percent in the normal up to 6.22 percent in the cataractous lens, while lecithin varies similarly from 0.63 percent to 4.52 percent. The author's experiments show that the lipid content of senile human cataracts is abnormally high. The blood cholesterol is also slightly elevated in patients with cataract. It is possible that this accumulation is the reply of the organism to certain poisons in the blood.

M. H. Post.

Vogt, A. **A novel experimental cataract: isolated posterior polar cataract produced by short-waved infrared in albinotic rabbits.** Klin. M. f. Augenh., 1931, v. 86, March, p. 289.

Vogt produced isolated posterior polar cortical cataract in the eyes of albinotic rabbits exposed for from thirty to sixty minutes to infrared rays, similar to the infrared cataract of glass blowers, blacksmiths, and founders. In pigmented rabbits the pigment disturbs the experiment, because, as shown by Vogt ten years ago, the pigment absorbs the rays and generates convective heat, which contributes to the cataract formation. This convection plays no part or a very small part in glass workers, because they are exposed to a chronic, cumulative action of much less intensity and not to the acute single ravages of much higher intensity in the experiments. In both, the first and greatest damage is done to the posterior subcapsular cortex. Glass worker's cataract occurs more at advanced age on account of sclerosis of the lens nucleus, which absorbs more short-waved infrared than the lens of young individuals with greater water content, naturally approaching the absorption by water. As Vogt's measurements proved, of all kinds of rays from the glass mass only the infrared are of genetic importance.

C. Zimmermann.

Vogt, A. **Does ultraviolet participate in the etiology of glass worker's cataract?** Klin. M. f. Augenh., 1931, v. 86, March, p. 295.

In Vogt's experiments with penetrating infrared ultraviolet does not participate in the formation of cataract, because it is completely eliminated by the iodine-potassium-iodide solution. Nor does ultraviolet participate in the development of glass worker's cataract. Vogt proved this by exposing photographic copying paper, which is chiefly sensitive to ultraviolet, to daylight at noon, and from a distance to the glow of the glass furnace at which the glass worker operates. The first was completely blackened after a few minutes, while the latter was still unaltered after three and more hours. Hence the ultraviolet of daylight even under an overcast winter sky by far predominates over that of the glowing glass mass. Vogt expresses the hope that the myth of ultraviolet damaging the lens will disappear from ophthalmological literature.

C. Zimmermann.

Yagues Garcia, Jose. **Impressions of phacoerisis.** Rev. Cubana de Oft. y Oto-Rino-Laringol., 1930, v. 3, Oct., p. 205.

The author returning from the Barraquer clinic at Barcelona gives an informal narrative regarding the general methods observed, especially those incident to cataract extraction. The author believes that this method of lens delivery causes less traumatism and reaction than when the zonule is ruptured by forceps, but his reasoning on this point is not entirely convincing. He admits that the method requires an unusual degree of manual dexterity, combined with great experience.

A. G. Wilde.

10. RETINA AND VITREOUS

Amsler, Marc. **On Gonin's operation.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 1.

In the first part Amsler discusses how Gonin came to do his operation. Gonin based the mechanism of detachment on traction from in front and emphasized the predominating part of the vitreous and the importance of the retinal tear. If the tear is closed the retina is fixated to the ocular wall by cicatricial tissue. Then the method of examination before operation, the technique after-treatment and observation, results and formulation of indication according to the author's own experience are dealt with. He operated on twenty-nine out of seventy-four eyes examined, with twelve complete reattachments, and discusses his reasons why he did not operate on the others. According to him the prognosis of Gonin's operation rests on the vitreous, not the choroid. Hence Gonin introduces his cautery into the vitreous, in order to include the altered portion of the vitreous in the scar and to avoid any local traction.

C. Zimmermann.

Ballou, De Forrest. **Incidence of retinal arteriosclerosis without general arteriosclerosis, in cases diagnosticated cerebral arteriosclerosis.** United States Veterans' Bureau Medical Bulletin, 1931, v. 7, Jan., p. 60.

Ballou studied a series of cases of cerebral (by an obvious printer's error referred to as "general" in the author's title) arteriosclerosis and decided that there was a striking frequency of retinal arteriosclerosis incidental to cerebral arteriosclerosis, especially as compared with general arteriosclerosis or other peripheral forms of arteriosclerosis. Other conclusions drawn are:

1. In a marked percentage of cases retinal arteriosclerosis accompanies cerebral arteriosclerosis, and it is a valuable confirmatory finding in the diagnosis of these cases. But it is not infallible, and fundus examination should be made in all cases suspected of this condition or diagnosed as being so affected.

2. Generalized arteriosclerosis is of little value in helping to make a diagnosis of cerebral arteriosclerosis, the incidence being only about thirty-five per cent.

3. Age is an uncertain factor in determining the expectancy of cerebral arteriosclerosis, and is of uncertain help in making the diagnosis of this condition.

4. The incidence of syphilis in this type of case seems to be extremely low, and as an etiological factor is very uncertain.

5. The diagnosis of cerebral arteriosclerosis can safely be made on neurological findings alone.

6. Cerebral arteriosclerosis seems to be an entity and syndrome of itself, and is not dependent on nor a part of coexisting generalized arteriosclerosis, nor related to the etiological factors commonly accepted for generalized arteriosclerosis. *Ralph W. Danielson.*

Chang, S. P. **A contribution to radium treatment in ophthalmology (corneal fistula and retinitis proliferans).** Nat. Med. Jour. China, 1931, v. 17, Feb., p. 81. (See Section 2, Therapeutics and operations.)

Genet, L. **Symmetric bilateral lesions of the maculæ in young persons.** Bull. Soc. d'Opht. de Lyon, 1930, v. 18, p. 92.

The study excludes macular lesions developing in myopes and also macular lesions of nerve origin. The macula with the fibers emerging from it is a true organ included within the retina and the optic nerve; and these symmetric lesions suggest this organ as predisposed to the disease that attacks it. Clinically the affection is generally familial, progressive, appearing in the infant or the adolescent up to fifteen years. It develops insidiously and is accompanied by a central scotoma for colors. Visual acuity is 1/10 to 2/10. Examination with the ophthalmoscope may be negative or may reveal small yellowish spots along the border of the macula. The Gullstrand lamp showed a violaceous and somewhat turgescent aspect of the macular region. *J. B. Thomas.*

NEWS ITEMS

News items in this issue were received from Drs. Sanford R. Gifford, Chicago, and G. Oram Ring, Philadelphia. News Items should reach **Dr. Melville Black,** 424 Metropolitan Bldg., by the ninth of the month.

Deaths

Dr. Charles Cumberson Boyle, New York; aged seventy-seven years; died June nineteenth.

Dr. James Hunter, Jr., Westville, New Jersey; aged sixty-five years; died June first of heart disease.

Dr. William Edson Boynton, Chicago; aged fifty-nine years; died May twenty-fifth, of chronic nephritis.

Dr. Robert H. T. Mann, Texarkana, Arkansas; aged sixty-three years; died April sixteenth, of carcinoma of the sigmoid.

Dr. George Wm. Boot, Evanston, Illinois; aged sixty-one years; died June fourteenth, of septicemia and diabetes mellitus.

Miscellaneous

A new twelve story building will be erected at the Medical Center in New York City which will provide facilities not only for the treatment and hospital care of all classes of eye patients, but also for the teaching of medical students and the training of nurses in this field, and for routine study and advanced research in all matters relating to this branch of medicine at Columbia University. The structure is the gift of Edward S. Harkness, who will provide for its equipment and maintenance. It will be the first unit in the group of projected specialty hospitals which are to surround the great central garden court lying to the south of the main buildings of the Medical Center. Administrative offices, examination and emergency treatment rooms and private practice offices will be located on the first floor. The second floor contains residential quarters for the staffs and the private offices of the director of the institute. Above this are the ward floors and the floors devoted to semiprivate and private patients' rooms. Provision has been made for beds at all rates, from free ward beds to the most costly private suites. The bed capacity will be 114. The institute will be under the direction of Dr. John M. Wheeler, professor of ophthalmology at Columbia University College of Physicians and Surgeons, and head of the ophthalmologic service at the Presbyterian Hospital.

University of Rochester School of Medicine and Dentistry is giving a second annual graduate course in ophthalmology beginning Monday, August 3rd, 1931. The course will cover a period of five days and will end on Friday evening, August 7th.

Guest speakers include, William L. Benedict, M.D., Arthur J. Bedell, M.D., Luther C. Peter, M.D., Robert Von der Heydt, M.D., John H. Dunnington, M.D., Frank Marlow, M.D., and Sanford Gifford, M.D.

Societies

The thirty-fourth Congrès de la société française d'ophtalmologie terminated its sessions in Paris on May seventh.

Dr. Willis E. Keith, Kansas City, has been elected President of the Kansas City Society of Ophthalmology and Oto-Laryngology; Drs. Morris B. Simpson, Kansas City, and Edwin N. Robertson, Concordia, Kansas, Vice-Presidents; Dr. Oliver S. Gilliland, Kansas City, Secretary; and Dr. Homer A. Beal, Kansas City, Treasurer.

A meeting of the Wills Hospital Society was held at the Bellevue Stratford Hotel, Philadelphia, on June ninth. Officers elected were Dr. Paul J. Pontius, President; Dr. Walter R. Parker, Vice-President; Dr. Warren S. Reese, Secretary-Treasurer. Dr. McCluney Radcliffe acted as toastmaster. Following the dinner, Dr. Edward Jackson of Denver discussed the new hospital. Dr. W. Campbell Posey read a paper on the history of Wills Hospital. The complete history is now being printed. Dr. George Rohrer related some interesting memories of the hospital in the eighties and Dr. William Zentmayer, who was associated with Dr. Wm. F. Norris for many years, briefly reviewed Dr. Norris's association with Wills Hospital and the distinguished place he occupied in American ophthalmology. Mr. Stephen Wierzbicki, superintendent of the hospital, outlined tentative plans for the placing of two hundred beds in the new hospital, approximately forty of which are to be used for private patients. The latter will be a greatly needed addition to the facilities of the hospital. The new building is to be equipped with the requirements of a modern ophthalmic hospital. Dr. Charles W. Kollock and Mr. Murtha P. Quinn, of the Board of City Trusts, were made honorary members.

Personals

Dr. Clarence Porter Jones of Newport News was recently elected president of the Virginia Society of Ophthalmology and Oto-Laryngology.

Dr. Sylvester J. Beach of Portland, Maine, announces that Dr. William R. McAdams, recently on the House Staff of the Manhattan Eye, Ear and Throat Hospital is now associated with him in practice.

Dr. Walter S. Franklin has been made emeritis clinical professor of ophthalmology, and Dr. Joseph L. McCool has been advanced from associate to clinical professor

of ophthalmology in the University of California Medical School.

At a recent meeting of the Colorado Congress of Ophthalmology and Oto-Laryngology, Dr. Luther C. Peter, of Philadelphia, contributed a paper on "Amblyopia Ex Anopsia in Adult Life." Dr. Peter expects to join Mrs. Peter for the month of August at Eagles Mere, Pennsylvania.

During the meeting of the American Medical Association in Philadelphia, in early June, the American Board for Ophthalmic Examinations held its meeting. The local arrangements for these examinations were made by Dr. Luther C. Peter of Philadelphia, a member of the Board. On the afternoon of June eleventh, Dr. Peter entertained a group of the visiting ophthalmologists at a luncheon at the Union League in honor of Dr. Magitot of Paris, and the officers of the Section of Ophthalmology; Dr. George F. Suker, Chairman; Dr. Hunter H. McGuire, Vice-Chairman; and Dr. William C. Finnoff, Secretary.

Dr. Nora M. Fairchild, of Omaha, has spent the winter in India, visiting the Holland Clinic at Quetta, that of Dr. Mattera Dass in the Punjab, and of Lt. Col. Kirwan in Calcutta and a Mission Hospital at Brindabar. She saw some interesting work and was invited to do a good deal of surgery. At the Mission Hospital a large amount of ophthalmic surgery is being done by the general surgeon in charge, and Dr. Fairchild was urgently invited to return and take charge of this work during the coming winter. Owing to economic conditions the clinics are not as well attended as in the previous years, but there is still a great amount of work. Dr. Fairchild is now in Vienna and will return home after visiting a number of other clinics.

Dr. G. E. deSchweinitz of Philadelphia made an address on the occasion of the dinner of the County Medical Society on Monday, June 8th, the subject being "Philadelphia as a Medical Center." At the reunion and luncheon of the Medical Veterans of the Great War, which was held on June ninth, Dr. deSchweinitz who is chairman, made a brief address of welcome which was followed by an elaborate program. The principal address was delivered by the new Surgeon General of the United States, Dr. Patterson. On Thursday, June eleventh, Dr. deSchweinitz delivered an address on the occasion of the meeting and dinner of the Alpha Omega Alpha Honorary Medical Association, the subject being "Concerning the Relationship of General and Specialized Medical Instruction and Practice." Among the special functions in connection with the University of Pennsylvania on June twelfth and thirteenth, the class of 1888, of which Dr. deSchweinitz was a graduate, celebrated the fiftieth anniversary. Fourteen members of the class were present. A dinner was given on the twenty-first by Dr. Daniel Longaker and the following day a luncheon by Dr. deSchweinitz. The latter function was followed by a participation in the functions of Alumni Day.

Dr. Wm. H. Luedde of St. Louis had a severe hemorrhage from a duodenal ulcer the first of July. We are glad to report he is making an excellent recovery.